

ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR FISCAL YEAR 2009

WEDNESDAY, APRIL 30, 2008

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
Washington, DC.

The subcommittee met at 9:32 a.m., in room SD-192, Dirksen Senate Office Building, Hon. Byron L. Dorgan (chairman) presiding.

Present: Senators Dorgan, Feinstein, Domenici, and Allard.

DEPARTMENT OF ENERGY

NATIONAL NUCLEAR SECURITY ADMINISTRATION

STATEMENT OF WILLIAM H. TOBEY, DEPUTY ADMINISTRATOR FOR DEFENSE NUCLEAR NONPROLIFERATION

OPENING STATEMENT OF SENATOR BYRON L. DORGAN

Senator DORGAN. The hearing will come to order. We thank all of you for being here today.

This is the Senate Appropriations Committee Subcommittee on Energy and Water Development. We are here to take testimony today of the National Nuclear Security Administration's fiscal year 2009 budget request for defense nuclear nonproliferation activities.

Today we have two panels. First we will hear from Deputy Administrator Will Tobey. He will be the first witness. The second panel will consist of two prominent nonproliferation experts. Dr. Siegfried Hecker is co-director at the Center for International Security and Cooperation at Stanford University and Dr. Matthew Bunn, senior research associate, Project on Managing the Atom at the John F. Kennedy School of Government at Harvard University. I thank all three for taking time out of their schedules to be with us.

The administration's budget request for the National Nuclear Security Administration's nonproliferation activities is \$1.25 billion for fiscal year 2009. The request is \$88 million less than the new budget authority provided in fiscal year 2008, but it is \$410 million less than the directed programmatic funding provided in the 2008 bill. If that sounds complicated, it is. The difference is due to the fact that in fiscal year 2008, we redirected the use of \$322 million in prior year balances. This fact in some ways distorts the year-to-year comparisons, but it is important to understand.

Further, in fiscal year 2008, we moved funding for the MOX facility over to the nuclear energy account and funding for the pit disassembly and conversion facility to the weapons activities. All of this makes getting adequate comparisons very, very difficult. Regardless, it is safe to say that we should have greater funding for these activities if we have the resources to do so.

In his written testimony today, Deputy Administrator Will Tobey says that the possibility that a rogue state or a terrorist will acquire nuclear or other weapons of mass destruction poses one of the most serious threats to the United States and to international security. President Bush has made the same point.

Today, Dr. Hecker and Dr. Bunn will also indicate that the threat is real and that greater financial resources are needed to be committed to the NNSA nonproliferation activities.

If there is a consensus about the threat of nuclear or other weapons of mass destruction, then the question is are we doing enough? Are we doing it well? What else should we be doing? Today we will review the budget request with the Deputy Administrator with those questions in mind.

Dr. Hecker and Dr. Bunn will discuss the adequacy of the budget request, but we will also ask their views on an array of nonproliferation policy and diplomatic challenges facing us here today. I have reviewed their testimony and they will cover some of that in their testimony.

North Korea, Iran, Syria are front-page reminders that proliferation concerns are real and immediate. And the questions arise as to whether the international community has the commitment and the appropriate means of dealing with countries which ignore international sentiment. Sanctions failed to stop India's development of a nuclear weapons program, and now we are considering nuclear cooperation agreements with that country. Agreements, I think, are unwise, by the way.

The 2005 Nuclear Nonproliferation Treaty review conference was a failure. Some argue that the administration contributed to that failure. I will ask about that today.

Renewed interest in civilian nuclear power use is on the rise around the world, and as we see in Iran, concern about enrichment capability has significant proliferation concerns regardless if it is claimed to be purely for civilian purposes.

These are just a few of the very significant nonproliferation policy and diplomatic challenges facing our country.

Obviously, the White House and the State Department drive the nonproliferation program policy, but NNSA provides the technical knowledge and capability to implement and verify.

We have a lot to cover in this hearing, and I want to make one point about this issue of nonproliferation. I think we have tried to do well as a country focusing on this, but in many ways it has become an orphan to so many other programs that have greater priority. And yet, some day we may well look in the rear view mirror and have seen a nuclear weapon exploded in a major city in this world and wonder what we could have done differently to stop the proliferation of nuclear weapons. There is not much more we do that exceeds in importance than the determination of this country to be a leader in nonproliferation. Some of our policies confound

me. Some of them worry me. Others I am pleased with. But I think the purpose of this hearing is to evaluate this issue of nonproliferation. Are we doing enough? What more should we be doing? Will we 5 and 10 years from now determine that we funded other things less important than this and short-funded this program? Let us hope not.

At any rate, we appreciate all three witnesses being here today, and let me call on the ranking member, Senator Domenici.

OPENING STATEMENT OF SENATOR PETE V. DOMENICI

Senator DOMENICI. Thank you very much, Mr. Chairman.

I have always looked forward to this hearing because the issue of nuclear nonproliferation is near and dear to my heart and of such great importance to our national security.

I am also pleased to welcome a former constituent, former Los Alamos Director Sig Hecker. Sig is an old and dear friend who I have relied on for advice for decades. I know that sounds funny—"decades"—because he is so young looking and it hardly seems like it could be decades, but it has been.

Mr. Chairman, I strongly encourage you to seek Dr. Hecker's advice and wisdom on matters of nonproliferation just as I have, and I guarantee that you will not be sorry if you do that.

Dr. Hecker, you have returned from your fifth trip to North Korea, as well as a recent trip to India. We look forward to hearing about your impressions of both countries.

Mr. Tobey and Dr. Bunn, I also appreciate your attendance and look forward to discussions with you involving the challenge of nuclear proliferation and what our priorities should be in response.

Mr. Chairman, I noted earlier that I have a strong passion for these accounts, and I believe that the United States must maintain its determination to keep the world's most dangerous weapons out of the hands of terrorists and the world's most dangerous regimes. This means doing more of what has been successful in the past and fixing known shortcomings. We cannot rely on luck to keep us safe. Preventing nuclear terrorism must remain a high priority. I have seen firsthand the challenges of reducing the enormous and sometimes poorly protected stockpile of the Soviet Union at the end of the cold war. Sig Hecker showed us many of those shortly after the cold war as they existed on the ground in places in the former Soviet Union.

Since 1991 when the Soviet Union collapsed, our Nation has invested nearly \$10 billion to lock up or destroy thousands of nuclear weapons and their delivery systems and hundreds of tons of nuclear material. The Department is now nearing completion of the security upgrades in Russia and the former Soviet republics. Just last week, one of the three remaining plutonium production reactors was shut down in Russia with U.S. assistance. In 2 years, we will complete the construction of coal plants in Russia necessary to enable the shutdown of two remaining production reactors.

The completion of these projects coincides with the new phase of our relationship with Russia. Russia is the leading exporter of natural gas, second leading oil producer in the world behind Saudi Arabia. With oil prices over \$100 per barrel, the Russian Government is no longer strapped for cash. This is a quite different situa-

tion than we initiated in the MPC&A program. Our cooperation should reflect this reality. We must pursue projects on the basis of shared benefits and shared contributions.

Our major project of mutual benefit has been the blend-down of Russian highly enriched uranium. In 5 years, we will come to an end of the HEU purchase agreement. At that time, 500 metric tons of HEU from dismantled Russian weapons will have been eliminated, the equivalent of 20,000 warheads' worth of material. This weapons material is being turned into commercial nuclear fuel, and today supplies 50 percent of the U.S. reactor requirements. This program is considered by many to be the most successful non-proliferation program ever implemented.

I believe we can and must do even more. When the HEU agreement ends in 2013, it is estimated that there will be hundreds of tons of excess HEU remaining in Russia. With the right commercial incentives, this can be an economic win for Russia and a security win for the world, just as the current agreement has been.

I am somewhat frustrated with the Russian suspension agreement signed by the administration in February. It provides 20 percent, Mr. Chairman, of the U.S. enrichment market, without any requirement for additional HEU down-blending, meaning they can sell to us without delivering any HEU, highly enriched uranium. That is what we should be talking about.

I have legislation that I shared with you which will correct this problem. The legislation would provide Russia in excess of 25 percent of the U.S. market if it continues the down-blend of HEU. At its current rate of 30 tons per year, it does not blend down any additional HEU, and access will be limited to 15 percent of our market. This legislation provides a clear economic incentive for Russia to eliminate an additional 300 tons of HEU.

Looking forward, we must do more to prevent states from acquiring nuclear weapons, and you are fully aware of that and I think we are in accord. We must also not allow the proliferative states like North Korea to help other states develop weapons, but it seems like there is little we can do. They are doing it. We find out while they are doing it or after they are doing it, and so goes the world.

Addressing these issues will require sustained investment. I am not sure we are investing enough, but you and I have found that this budget is profoundly difficult and it is not getting any easier year by year.

Thank you very much, Mr. Chairman.

Senator DORGAN. Senator Domenici, thank you very much.

Administrator Tobey, thank you very much for being with us, you may proceed and the statements that you and the other two witnesses provide today will be inserted into the record in full, and you may summarize. Thank you very much.

STATEMENT OF WILLIAM H. TOBEY

Mr. TOBEY. Chairman Dorgan, Senator Domenici, thank you for the opportunity to discuss the President's fiscal year 2009 budget request for the National Nuclear Security Administration's Office of Defense Nuclear Nonproliferation.

At what may be my last opportunity to speak before this subcommittee, I would particularly like to thank Senator Domenici for his leadership on nonproliferation. You have been a great champion of the NNSA, and we are all deeply appreciative of that.

I would also like to recognize the men and women of the NNSA who work so hard to detect, secure, and dispose of dangerous nuclear material around the world. They have braved freezing conditions in Siberia, Hezbollah rocket attacks at Haifa, very difficult conditions at Yongbyon in North Korea, and through it all, they have never failed to accomplish their missions. And I feel honored to work with them.

The fiscal year 2009 budget request for the Office of Defense Nuclear Nonproliferation totals \$1.247 billion. This amount will allow us to continue our mission to detect, secure, and dispose of dangerous nuclear and radiological materials, strengthen the international nonproliferation partnerships, and meet evolving proliferation and international security threats.

Specifically, this funding will advance our priorities to, one, enhance national capabilities to detect and interdict nuclear and radiological materials at key seaports and border crossings; two, reduce and eliminate stores of highly enriched uranium, weapon-grade plutonium, and vulnerable radiological materials across the globe; and three, work to ensure the sustainability of nuclear security upgrades in Russia and the international nonproliferation system.

As was recognized, last week we announced the shutdown of a plutonium production reactor at Seversk, something that we have been working with the Russians on for years now, and this is an important achievement and shows tangible results in our efforts.

We recognize that the best way to reduce the threat of proliferation or terrorist acquisition of nuclear weapons or devices is by denying them access to the necessary nuclear and radiological materials in the first place. To that end, our fiscal year 2009 request will allow us to accelerate our work, including installation of radiation detection systems at nine additional ports under our Megaports program for a total of 32 Megaport sites worldwide, helping to secure 49 border crossings and other high-risk points of entry under our Second Line of Defense Program and expanding export control and commodity identification training activities with more than 50 countries.

Additionally, in fiscal year 2009, we will undertake a new initiative to strengthen international safeguards to prevent the diversion of nuclear material from peaceful uses. This Next Generation Safeguards Initiative will develop the safeguards technologies and human resources needed to sustain our nonproliferation efforts while promoting international partnerships and meeting the challenges of growing nuclear energy demand.

Underpinning all these efforts is our nonproliferation research and development work through which we will continue our leadership as the principal Federal sponsor of long-term proliferation-related R&D on nuclear detection and characterization.

Our fiscal year 2009 request will allow us to accelerate our efforts under the Global Threat Reduction Initiative to convert HEU-fueled research reactors around the globe to the use of less proliferation-sensitive, low enriched uranium. We will also continue to

repatriate U.S.- and Russian-origin highly enriched uranium to secure sites, secure high priority nuclear and radiological sites globally, and secure and remove orphan radiological sources that could be used in dirty bombs. To date, we have removed enough nuclear material for nearly 70 nuclear weapons and secured more than enough radiological sources for over 8,000 dirty bombs. In fiscal year 2009, we will convert an additional 8 HEU reactors to LEU, remove an additional 700 kilograms of HEU, and secure an additional 125 radiological sites across the globe.

Last year I updated you on our progress under the 2005 Bratislava joint statement on nuclear security in which we have partnered with Russia to secure its nuclear weapons and sites of highest concern. I am pleased to report that we have completed 85 percent of these upgrades to date and are on track to complete our work under the Bratislava Agreement by the end of calendar year 2008. In fiscal year 2009, should Congress grant our request for resources, our focus will be on completing additional high priority security work beyond the Bratislava Agreement.

Additionally, our fiscal year 2009 budget request also includes funding to ensure the shutdown of the last remaining Russian plutonium production reactor by 2010, which will prevent the production of about one-half ton of weapons-grade plutonium annually. We will continue our efforts to facilitate Russia's commitment to dispose of 34 metric tons of surplus Russian weapons-grade plutonium and to disposition excess Russian and U.S. highly enriched uranium.

Just last week, we were pleased to announce that the United States and Russia have eliminated 10 metric tons of Russian weapons-usable nuclear material. This material, equivalent to 400 nuclear weapons, was successfully converted by down-blending highly enriched uranium to low enriched uranium under a joint U.S.-Russian program. These material security efforts enhance our work to strengthen the nonproliferation regime and the multilateral partnerships supporting it.

In this regard, we will continue to support the work plan of the Global Initiative to Combat Nuclear Terrorism and to advance the objectives of the United Nations Security Council resolution 1540, which mandate effective export controls, criminalize proliferation of WMD by non-state actors, and require states to secure proliferation-sensitive materials.

We will likewise continue our technical and diplomatic support of U.S. efforts on the Nuclear Nonproliferation Treaty within the Nuclear Suppliers Group and on multilateral initiatives such as international fuel assurances and disablement of North Korean nuclear facilities. We recognize that just as today's proliferation and terrorism threats are global in scope, so too must be the responses we undertake to address them.

I am mindful of the comments that were made at the outset of the hearing about the importance and urgency of our work. I would note that we have worked hard to accelerate our efforts across the board, including accelerating the conversion of reactors from highly enriched uranium to low enriched uranium, increasing nuclear material security under the Bratislava Initiative which advanced the completion of work in Russia by about 2 years, signing an agree-

ment with Russia on the Second Line of Defense Program which advanced the completion of securing Russia's borders by about 6 years, and in fact, even advancing our work under the elimination of weapons-grade plutonium production reactors such that we have shut down one of the reactors months early and we are still optimistic that we can shut down the last remaining reactor perhaps even a year early.

I am also quite mindful of the need, given the importance of our work, of listening to others about this work. I have appreciated the advice that we have gotten from this committee, both members and staff. We have worked hard to try and take it into account as we proceeded with our work.

PREPARED STATEMENT

I am also grateful to the advice that we have received from the members of the second panel. Even before I had been confirmed, I sought the advice of other experts on what our job should be and how we should execute it, and frankly, the advice that I found most comprehensive and useful was that of Dr. Hecker. We also speak frequently with Dr. Bunn, and his advice and his report that he completes on securing the bomb has been helpful in setting forth our priorities. We have tried to reflect that, as well as our own thinking, in how we execute these programs and I am grateful for all of that help.

Thank you.

[The statement follows:]

PREPARED STATEMENT OF WILLIAM H. TOBEY

Thank you for the opportunity to discuss the President's fiscal year 2009 budget request for the National Nuclear Security Administration (NNSA). I want to thank all of the members for their strong support for our vital national security missions.

In the 8th year of this administration, with the support of Congress, NNSA has achieved a level of stability that is required for accomplishing our long-term missions. Our fundamental national security responsibilities for the United States include:

- Assuring the safety, security and reliability of the U.S. nuclear weapons stockpile while at the same time considering options for transforming the stockpile and the complex infrastructure that supports it;
- Reducing the threat posed by proliferation of nuclear weapons, material and expertise; and
- Providing reliable and safe nuclear reactor propulsion systems for the U.S. Navy.

NNSA is examining how to proceed into the future to address evolving national security needs in a manner that anticipates significant changes in how we manage our national security programs, our assets and our people. To that end, the fiscal year 2009 budget request for \$9.1 billion, a decrease of \$35 million from the fiscal year 2008 Consolidated Appropriations Act, supports NNSA's crucial national security mission. My testimony today will focus on NNSA's Defense Nuclear Non-proliferation budget request for fiscal year 2009.

DEFENSE NUCLEAR NONPROLIFERATION

The possibility that rogue states or terrorists might acquire nuclear and other weapons of mass destruction (WMD) and their related technologies, equipment and expertise, poses one of the most serious threats to the United States and international security. The continued pursuit of nuclear weapons by terrorists and states of concern underscores the urgency of NNSA's efforts to secure vulnerable nuclear weapons and weapons-usable nuclear material, to detect and interdict nuclear and radiological materials and WMD-related equipment, to halt the production of fissile material for weapons, to dispose of surplus weapons-usable material, and to contain the proliferation of WMD technical expertise. The fiscal year 2009 budget request

will enable NNSA to continue these critical activities that support threat reduction initiatives vital to U.S. national security.

Preventing access to nuclear weapons and fissile material has many dimensions. Our highest priority is to keep these dangerous materials out of the hands of the world's most dangerous actors. Absent access to a sufficient quantity of essential fissile materials, there can be no nuclear weapon. The most direct way to prevent acquisition of nuclear weapons is by denying access to fissile material. Historically, much of our materials security emphasis focused on Russia because that is where most of the poorly secured material was located. We have made remarkable progress cooperating with Russia to strengthen protection, control, and accounting of its nuclear weapons and materials. We recently completed security upgrades at 25 Russian Strategic Rocket Force sites and will meet our commitment to conclude agreed-to security upgrade activities at Russian nuclear sites by the end of this year, as provided for under the Bratislava Joint Statement signed by Presidents Bush and Putin. Although these direct upgrade efforts are largely drawing to a close after over a decade of work, we will continue security upgrade work at some sites added to our work scope after the Bratislava summit, and will continue to work cooperatively with Russia to ensure the long-term sustainability of the systems and procedures already implemented. We recently reached agreement with Russia on a sustainability plan that identifies the requirements for long-term Russian maintenance and infrastructure of security upgrades under our cooperative program.

However, not all nuclear material of proliferation concern is located in Russia. We are also working with other partners to secure weapons-usable nuclear materials in other parts of the world, and to strengthen security at civil nuclear and radiological facilities. One area of particular concern is research reactors, which often use highly enriched uranium (HEU) fuel otherwise suitable for bombs. Our Global Threat Reduction Initiative (GTRI) converts research reactors around the world from HEU to low enriched uranium (LEU) fuel. The GTRI program, and its antecedents, have removed approximately 68 nuclear bombs' worth of highly enriched uranium and secured more than 600 radiological sites around the world, collectively containing over 9 million curies, enough radiation for approximately 8,500 dirty bombs. In the United States the GTRI program has removed over 16,000 at-risk radiological sources, totaling more than 175,000 curies—enough for more than 370 dirty bombs.

An additional nuclear security challenge concerns the effectiveness and credibility of international nuclear safeguards. Against the backdrop of growing nuclear energy demand, concerns over the diffusion of sensitive nuclear technologies, and the challenges posed by Iran and North Korea, international safeguards are coming under increasing strain. To address this challenge, NNSA has launched the Next Generation Safeguards Initiative (NGSI), which will ensure U.S. leadership and investment in our technologies and experts in the service of nuclear nonproliferation. Enhanced and revitalized international safeguards will also help ensure the sustainability of the gains made by our associated threat reduction efforts.

Additionally, in fiscal year 2009, we will continue to lead the U.S. Government efforts to oversee the disablement and dismantlement of North Korea's nuclear program. However, in order to continue our support for these critical disablement and dismantlement activities, we will require a waiver of the Glenn Amendment restrictions that were triggered by North Korea's 2006 nuclear test, as well as more substantial funding. The Glenn Amendment prohibits the Department of Energy, which would otherwise fund denuclearization activities, from providing any financial assistance to North Korea. Without this waiver, the Department will be unable to complete Phase Three denuclearization activities. NNSA and the administration have been working to insert language into the fiscal year 2008 Iraq War Supplemental, or any other appropriate legislative vehicle, to provide such a waiver.

We are also taking aggressive steps to interdict illicit transfers of weapons-usable nuclear materials and equipment, and to prevent dissemination of related sensitive nuclear technology via strengthened export controls and cooperation. We currently provide export control and commodity identification training to over 50 countries across the globe, in order to improve nations' capabilities to deter and interdict illicit WMD-related technology transfers. As an important complement to physical security improvements, the Second Line of Defense Program enhances our foreign partners' ability to interdict illicit trafficking in nuclear materials through the deployment of radiation detection systems at high-risk land-border crossings, airports and sea-ports. These efforts increase the likelihood of interdicting illicit nuclear materials entering or leaving the country. To date, 117 Russian border crossings have been equipped with radiation detection equipment under this program.

As part of the Second Line of Defense, the Megaports Initiative, established in 2003, responds to concerns that terrorists could use the global maritime shipping network to smuggle fissile materials or warheads. By installing radiation detection

systems at major seaports throughout the world, this initiative strengthens the detection and interdiction capabilities of our partner countries. At the end of 2007, the Megaports program was operational in 12 countries and being implemented at 17 additional ports. In addition, we continue to carry out nonproliferation research and development activities, developing, demonstrating and delivering novel nuclear material and nuclear detonation detection technologies for nonproliferation and homeland security applications.

Since the end of the cold war, the Nation's adversaries have been quick to adapt to technological improvements. Staying ahead of the R&D curve is critically important to keeping our Nation safe and secure. As the principal Federal sponsor of long-term nuclear nonproliferation-related research and development, NNSA focuses its R&D investments on leading-edge, early stage basic and applied R&D programs, including testing and evaluation, which lead to prototype development and improvements in nuclear detection and characterization systems. By concentrating on these key R&D components, NNSA helps strengthen the U.S. response to current and projected WMD threats.

These critical steps are only part of a comprehensive nonproliferation program. In addition to these efforts to secure, detect, and interdict weapons-usable materials, we also work to eliminate weapons-usable material. Indeed, there remains enough fissile material in the world today for tens of thousands of weapons. An integral part of our strategy, therefore, has been to encourage other states to stop producing materials for nuclear weapons, as the United States itself did many years ago. For example, Russia still produces weapons-grade plutonium, not because it needs it for weapons, but because the reactors that produce it also supply heat and electricity to local communities. We are helping to replace these non-commercial style reactors with fossil fuel plants, thereby eliminating their production of plutonium. We had the goal this year of shutting down two of the remaining three plutonium-producing reactors in Russia permanently. Last week we announced the elimination of the production of nuclear weapons-grade plutonium at the Seversk site. This is a historic nonproliferation milestone. The third at Zheleznogorsk will shut down in December 2010, if not, as we hope, sooner.

As previously indicated, there are a number of effective synergies between NNSA's defense activities and our nuclear nonproliferation objectives. For example, we are disposing of the substantial quantities of surplus weapons grade HEU that has resulted from the thousands of warheads we have dismantled, by downblending it to lower enrichment levels suitable for use in commercial reactors. This past February marked the 15th anniversary of the U.S.-Russia HEU Purchase Agreement—one of the most successful nonproliferation programs ever conceived. Under the HEU Purchase Agreement, over 322 metric tons of uranium from Russia's dismantled nuclear weapons—enough material for more than 12,000 nuclear weapons—has been downblended for use in commercial power reactors in the United States. Nuclear power generates 20 percent of all American electricity, and half of that is generated by fuel derived from Russian HEU. As a result, one-tenth of U.S. electricity is made possible by material removed from former Soviet nuclear weapons.

Similarly, disposition of surplus U.S. HEU through downblending to low-enriched uranium has been proceeding for nearly a decade and progress is continuing. As of the end of December 2007, approximately 92 metric tons of HEU, equivalent to over 3,500 nuclear weapons, have been downblended and converted to power or research reactor fuel, and an additional 13 metric tons have been delivered to disposition facilities for near-term downblending. This HEU disposition progress has already contributed substantially to nuclear material consolidation efforts in the Department of Energy complex, eliminating the necessity for high security storage at two sites, and greatly reducing it at several others.

In addition to the efforts on HEU, the United States and Russia have each committed to dispose of 34 metric tons of surplus weapon-grade plutonium. In November 2007, we signed a joint statement with Russia that represents a technically and financially credible plan to dispose of 34 metric tons of Russia's surplus plutonium in fast reactors. Under this approach, Russia will pay for the majority of costs and begin disposing of its surplus plutonium in the 2012 timeframe. Last year, the Department of Energy began construction of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site. The facility originally planned to dispose of 34 metric tons of surplus weapon-grade plutonium by converting it into mixed oxide (MOX) fuel to be irradiated in commercial nuclear reactors, producing electricity and rendering the plutonium undesirable for weapons use. Last September, at the IAEA General Conference in Vienna, Secretary Bodman announced that an additional 9 metric tons of plutonium, enough to make approximately 1,100 nuclear weapons would be removed from such use and eliminated by conversion to mixed oxide fuel.

The MOX facility is a critical component of the Department's surplus plutonium consolidation efforts and is essential to the goal of transforming the complex.

Our efforts at home are not enough, in and of themselves. We need cooperation from our international partners as well, and if we are to encourage responsible international actions, the United States must set the example. We have dramatically improved physical security of U.S. nuclear weapons and weapons-usable materials in the years since the September 11, attacks. We have made substantial reductions in our stockpile and made additional plutonium available for conversion into civilian reactor fuel. Additionally our Complex Transformation will further reduce the number of sites and locations where we store special nuclear materials, providing for improved security of these materials.

The risk of nuclear terrorism is not limited to the United States. The success of our efforts to deny access to nuclear weapons and material is very much dependent on whether our foreign partners similarly recognize the threat and help us to combat it. To this end, we undertake efforts to strengthen the nonproliferation regime and expand international nonproliferation efforts. We continue to provide technical and policy support to U.S. efforts within the nonproliferation regime, including support to the Nuclear Nonproliferation Treaty, the Nuclear Suppliers Group, the International Atomic Energy Agency and a wide range of U.S. diplomatic initiatives, including the efforts in North Korea. We also have strengthened international collaboration and dialogue on nonproliferation efforts, including developing an international mechanism through which seven countries have pledged some \$45 million in contributions to our nonproliferation programs.

In July 2006, Presidents Bush and Putin announced the Global Initiative to Combat Nuclear Terrorism to strengthen cooperation worldwide on nuclear materials security and to prevent terrorist acts involving nuclear or radioactive substances. By the end of 2007, 64 nations had joined this Global Initiative, and a number of subject matter expert conferences and training activities have been conducted. Most recently in December 2007, representatives from 15 nations participated in Global Initiative to Combat Nuclear Terrorism Radiation Emergency Response workshop held in China by the NNSA. Paired with U.N. Security Council Resolution 1540 and working closely with our overseas partners, we now have both the legal mandate and the practical means necessary for concrete actions to secure nuclear material against the threat of diversion.

FISCAL YEAR 2009 BUDGET REQUEST PROGRAMMATIC DETAIL

The President's fiscal year 2009 budget request for NNSA totals \$9.1 billion, a decrease of \$35.0 million or 0.4 percent less than the fiscal year 2008 Consolidated Appropriations level. We are managing our program activities within a disciplined 5-year budget and planning envelope, and are successfully balancing the administration's high priority initiatives to reduce global nuclear danger as well as future planning for the Nation's nuclear weapons complex within an overall modest growth rate.

The NNSA budget justification contains information for 5 years as required by sec. 3253 of Public Law 106-065, the National Defense Authorization Act for Fiscal Year 2000. This section, entitled Future-Years Nuclear Security Program, requires the Administrator to submit to Congress each year the estimated expenditures necessary to support the programs, projects and activities of the NNSA for a 5-year fiscal period, in a level of detail comparable to that contained in the budget.

The fiscal year 2009-2020 13 Future Years Nuclear Security Program—FYNSP—projects \$47.7 billion for NNSA programs through 2013. This is a decrease of about \$2.3 billion over last year's projections. The fiscal year 2009 request is slightly smaller than last year's projection; however, the outyears increase starting in fiscal year 2010.

Defense Nuclear Nonproliferation Budget Summary

The Defense Nuclear Nonproliferation Program mission is to detect, prevent, and reverse the proliferation of weapons of mass destruction (WMD). Our nonproliferation programs address the threat that hostile nations or terrorist groups may acquire weapons-usable material, equipment or technology, or WMD capabilities. The administration's fiscal year 2009 request totals \$1.247 billion for this program, reflecting a return to measured growth from the fiscal year 2007 appropriation level, but a decrease from the final fiscal year 2008 appropriation, which included a large Congressional plus-up over the President's request. The decrease also reflects Congressional action to transfer funding for some construction projects to other budget accounts, and the anticipated decrease of other major construction activities under the Elimination of Weapons Grade Plutonium Production Program in 2008, following completion of major elements of that program's work scope.

GLOBAL THREAT REDUCTION INITIATIVE

The fiscal year 2009 request of \$220 million for the Global Threat Reduction Initiative (GTRI) is an increase of \$27 million over the fiscal year 2008 operating plan. This funding will support GTRI's mission to reduce and protect vulnerable nuclear and radiological materials at civilian sites worldwide by converting reactors from HEU to LEU, removing excess nuclear/radiological materials, and protecting high priority nuclear/radiological material from theft and sabotage. Specific increases in the GTRI budget reflect an acceleration of (1) Bratislava efforts to repatriate Russian-origin HEU and convert HEU reactors to LEU; (2) efforts to develop a new ultra-high density LEU fuel needed to convert 28 high performance reactors around the world; (3) the removal of nuclear materials not covered under other existing programs; and (4) security upgrades on high priority HEU and radioactive materials located in the United States.

INTERNATIONAL MATERIAL PROTECTION AND COOPERATION

NNSA's International Material Protection and Cooperation fiscal year 2009 budget request of \$429.7 million represents a decrease of \$194.8 million from the fiscal year 2008 appropriated level. This large decrease reflects: (1) the anticipated completion of major elements of nuclear security upgrade work performed under the Bratislava Agreement; (2) completion of the majority of nuclear security upgrades in countries outside of Russia; and (3) large Congressional increases for this work over the President's fiscal year 2008 budget request. During the past 15 years, the Material Protection Control and Accounting (MPC&A) program has secured 85 percent of Russian nuclear weapons sites of concern, and work is underway to complete this work by the end of fiscal year 2008. To maintain this progress, MPC&A and Rosatom have developed a new joint plan identifying elements required for Rosatom's long-term sustainability of U.S.-installed security enhancements. In fiscal year 2009, international material protection activities will focus on the continued enhancement of Russia's capability to operate and maintain U.S.-funded security improvements in the long-term. The MPC&A Program is also focused on reducing proliferation risks by converting Russian HEU to LEU and by consolidating weapons-usable nuclear material into fewer, more secure locations. In fiscal year 2009, we will eliminate an additional 1.4 metric tons of Russian HEU for a cumulative total of 12.4 metric tons.

Our Second Line of Defense (SLD) Program installs radiation detection equipment at key transit and border crossings, airports and major seaports to deter, detect and interdict illicit trafficking in nuclear and radioactive materials. The SLD Core Program, which installs radiation detection equipment at borders, airports, and strategic feeder ports, has equipped 117 sites in Russia. The United States and Russia have agreed to jointly fund work to equip all of Russia's border crossings with radiation detection equipment by the end of 2011, 6 years ahead of schedule. The Core Program has also equipped 33 sites outside of Russia with radiation detection systems. The SLD Megaports Initiative has deployed radiation detection and cargo scanning equipment at 12 ports to date in the Netherlands, Greece, Bahamas, Sri Lanka, Singapore, Spain, the Philippines, Belgium, Honduras, Pakistan, the United Kingdom, and Israel. Various stages of implementation are underway at ports in 16 other locations.

During fiscal year 2009, the SLD Core Program is planning to complete an additional 49 sites. The SLD Megaports Initiative plans to complete work at nine key ports in fiscal year 2009 in Israel, Jordan, Spain, Mexico, China, the United Arab Emirates, Saudi Arabia, Oman, and Taiwan. We will continue progress on separate ports in Spain and Mexico, and will initiate new work in fiscal year 2009 at ports in Argentina, Brazil, and Malaysia. The Megaports program is also pursuing outreach activities in northeastern Africa and other key regions of concern. Fiscal year 2009 funding will also support the procurement of Advanced Spectroscopic Portals (ASP) and mobile detection systems, including Mobile Radiation Detection & Identification Systems (MRDIS) and Radiation Detection Straddle Carriers (RDSC). The Megaports Initiative also works closely with the U.S. Department of Homeland Security's Bureau of U.S. Customs and Border Protection (CBP) by making technical resources available to complement the Container

Security Initiative (CSI) and the Secure Freight Initiative (SFI) at international ports. Under SFI, all U.S.-bound containers are being scanned at three ports in Pakistan, Honduras, and the United Kingdom, fulfilling the 2006 SAFE Ports Act to couple non-intrusive imaging equipment and radiation detection equipment in order to demonstrate the effectiveness of 100 percent scanning of U.S.-bound containers. SLD Megaports has also partnered with CBP at four, limited capacity SFI locations in Hong Kong, Oman, Korea, and Singapore. The Megaports Initiative is

installing radiation detection equipment at all CSI ports and has worked with CBP to pursue, where feasible, joint agreements with host nations to implement both the Megaports and SFI programs.

NONPROLIFERATION AND INTERNATIONAL SECURITY

The Nonproliferation and International Security (NIS) mission is to prevent, mitigate, and reverse WMD proliferation by providing policy and technical support to strengthen international nonproliferation regimes, institutions, and arrangements; promote foreign compliance with nonproliferation norms and commitments; and eliminate or reduce proliferation programs and stockpiles. Major NIS strategic priorities in fiscal year 2009 include supporting the safe and secure expansion of nuclear energy use and disablement, dismantlement, and verification of nuclear programs in North Korea. NIS will also support the Next Generation Safeguards Initiative (NGSI) to strengthen international safeguards, revitalize the U.S. technical and human resource base that supports them, and develop the tools, approaches, and authorities needed by the International Atomic Energy Agency to fulfill its mandate far into the future.

In fiscal year 2009, NIS also will confirm the permanent elimination from the Russian weapons stockpile of 30 metric tons of HEU; control the export of items and technology useful for WMD programs; continue an augmented export control cooperation program involving emerging suppliers and high-traffic transit states; break up proliferation networks and improve multilateral export control guidelines; develop and implement policy in support of global nonproliferation regimes; train 2,500 international and domestic experts in nonproliferation; provide technical expertise to the USG to support various WMD interdiction activities; develop and implement transparency measures to ensure that nuclear materials are secure; transition 300 Russian and FSU WMD experts to long-term private sector jobs; and make the preparations necessary for the USG's \$50 million contribution to the International Atomic Energy Agency for the establishment of the International Nuclear Fuel Bank—an international effort to establish a back-up nuclear fuel supply for peaceful uses.

ELIMINATION OF WEAPONS GRADE PLUTONIUM PRODUCTION

Turning to programs that focus on halting the production of nuclear materials, the Elimination of Weapons Grade Plutonium Production (EWGPP) Program is working towards completing the permanent shutdown of the three remaining weapons-grade plutonium production reactors in Seversk and Zheleznogorsk, Russia. The fiscal year 2009 budget request of \$141 million reflects a decrease of \$38 million from the fiscal year 2008 level due to the successful shutdown at Seversk last week. The budget profile provides the funding required to replace the heat and electricity these reactors would otherwise supply to local communities with energy generated by fossil fuel, permitting the Russians to permanently shut down these reactors. The reactor at Zheleznogorsk will be shut down by December 2010, if not sooner. This construction activity thus leads to the elimination of more than 1 metric ton of weapons-grade plutonium production per year.

FISSILE MATERIALS DISPOSITION

The Fissile Materials Disposition program request for fiscal year 2009 is \$41.8 million. The program retains three principal elements: efforts to dispose of U.S. highly enriched uranium (HEU) declared surplus to defense needs primarily by down-blending it into low enriched uranium; technical analyses and support to negotiations involving the United States, Russia, and the International Atomic Energy Agency (IAEA) on monitoring and inspection procedures under the 2000 U.S.-Russia plutonium disposition agreement; and limited support for the early disposition of Russia's plutonium in that country's BN-600 fast reactor including U.S. technical support for work in Russia for disposition of Russian weapon-grade plutonium in fast reactors generally.

The fiscal year 2008 Consolidated Appropriations Act (Public Law 110-161) appropriated funding for the Mixed Oxide Fuel (MOX) Fabrication Facility Project in South Carolina in the Department of Energy's Office of Nuclear Energy account and funding for the related Pit Disassembly and Conversion Facility/Waste Solidification Building projects in the NNSA Weapons Activities account. These projects remain important components of the Nation's nuclear nonproliferation efforts. In total, the funding commitment to the Department of Energy's nonproliferation activities is \$1.853 billion in 2009. The MOX project is a key component of the U.S. strategy for plutonium disposition. It is the centerpiece of a comprehensive approach for disposing of surplus weapons-usable plutonium by fabricating it into mixed-oxide fuel

for irradiation in existing nuclear reactors. This meets key national security and nonproliferation objectives by converting the plutonium into forms not readily usable for weapons and supports efforts to consolidate nuclear materials throughout the weapons complex.

In addition to its role in the disposition of excess nuclear materials at home, the U.S. views the MOX project as a key component of U.S. global nuclear nonproliferation efforts in which fissile material disposition is the final step in a balanced nuclear nonproliferation strategy aimed at employing measures necessary to detect, secure, and dispose of dangerous nuclear material. In 2007, the U.S. and Russian governments agreed on a framework for a technically and financially credible Russian plutonium disposition program based on the irradiation of plutonium as MOX fuel in fast reactors. When all required steps have taken for implementation, it will enable the United States and Russia to meet their commitments under a 2000 agreement to dispose of a combined total of 68 metric tons of surplus weapon-grade plutonium—enough material for approximately over 8,000 nuclear weapons.

This budget request also seeks funding to dispose of surplus U.S. HEU, including downblending 17.4 metric tons of HEU to establish the Reliable Fuel Supply, which would be available to countries with good nonproliferation credentials that face a disruption in supply that cannot be corrected through normal commercial means. This initiative marks an important first step creating a reliable nuclear fuel mechanism that could provide countries a strong incentive to refrain from acquiring their own enrichment and reprocessing capabilities.

NONPROLIFERATION AND VERIFICATION RESEARCH AND DEVELOPMENT

The fiscal year 2009 budget requests \$275 million for Nonproliferation and Verification Research and Development. This effort encompasses two primary programs that make unique contributions to national security by conducting research and development into new technical capabilities to detect illicit foreign production, diversion or detonation of nuclear materials. The Proliferation Detection Program conducts research across a spectrum of technical disciplines that supports the NNSA mission, national and homeland security agencies and the counterterrorism community. Specifically, this program develops the tools, technologies, techniques, and expertise required for the identification, location, and analysis of facilities, materials, and processes of undeclared and proliferant nuclear programs. The Nuclear Detonation Detection Program produces the Nation's space-based operational sensors that monitor the entire planet to detect and report surface, atmospheric, or space nuclear detonations. This program also produces and updates regional geophysical datasets that enable and enhance operation of the Nation's seismic nuclear detonation detection network.

APPROPRIATION AND PROGRAM SUMMARY TABLES—OUT-YEAR APPROPRIATION SUMMARY TABLES—FISCAL YEAR 2009 BUDGET TABLES

NATIONAL NUCLEAR SECURITY ADMINISTRATION—OVERVIEW

[In thousands of dollars]

| | Fiscal Year 2007 Current Approp- riations | Fiscal Year 2008 Original Approp- riation | Fiscal Year 2008 Adjustments | Fiscal Year 2008 Current Approp- riation | Fiscal Year 2009 Request |
|--|---|---|---------------------------------|--|-----------------------------|
| National Nuclear Security Adminis- tration: | | | | | |
| Office of the Administrator | 358,291 | 405,987 | — 3,850 | 402,137 | 404,081 |
| Weapons Activities | 6,258,583 | 6,355,633 | — 58,167 | 6,297,466 | 6,618,079 |
| Defense Nuclear Nonprolifera- tion | 1,824,202 | 1,673,275 | — 15,279 | 1,657,996 | 1,247,048 |
| Naval Reactors | 781,800 | 781,800 | — 7,114 | 774,686 | 828,054 |
| Total, NNSA | 9,222,876 | 9,216,695 | — 84,410 | 9,132,285 | 9,097,262 |
| Rescission of Prior Year Bal- ances | | — 322,000 | | — 322,000 | |
| Total, NNSA (OMB Scoring) | 9,222,876 | 8,894,695 | — 84,410 | 8,810,285 | 9,097,262 |

**OUT-YEAR APPROPRIATION SUMMARY—NNSA FUTURE-YEARS NUCLEAR SECURITY PROGRAM
(FYNSP)**

[In thousands of dollars]

| | Fiscal Year 2009 | Fiscal Year 2010 | Fiscal Year 2011 | Fiscal Year 2012 | Fiscal Year 2013 |
|--|------------------|------------------|------------------|------------------|------------------|
| NNSA: | | | | | |
| Office of the Administrator | 404,081 | 419,848 | 436,266 | 451,771 | 469,173 |
| Weapons Activities | 6,618,079 | 6,985,695 | 7,197,844 | 7,286,912 | 7,460,318 |
| Defense Nuclear Nonproliferation | 1,247,048 | 1,082,680 | 1,076,578 | 1,111,337 | 1,133,982 |
| Naval Reactors | 828,054 | 848,641 | 869,755 | 880,418 | 899,838 |
| Total, NNSA | 9,097,262 | 9,336,864 | 9,580,443 | 9,730,438 | 9,963,311 |

DEFENSE NUCLEAR NONPROLIFERATION

[In thousands of dollars]

| Funding Profile by Subprogram | Fiscal Year 2007 Current Appropriation | Fiscal Year 2008 Original Appropriation | Fiscal Year 2008 Adjustments | Fiscal Year 2008 Current Appropriation | Fiscal Year 2009 Request |
|--|---|--|---------------------------------|---|-----------------------------|
| Defense Nuclear Nonproliferation: | | | | | |
| Nonproliferation and Verification Research and Development | 265,197 | 390,752 | — 3,556 | 387,196 | 275,091 |
| Nonproliferation and International Security | 128,911 | 151,370 | — 1,377 | 149,993 | 140,467 |
| International Nuclear Materials Protection and Cooperation | 597,646 | 630,217 | — 5,735 | 624,482 | 429,694 |
| Elimination of Weapons-Grade Plutonium Production | 231,152 | 181,593 | —1,653 | 179,940 | 141,299 |
| Fissile Materials Disposition .. | 470,062 | 66,843 | — 608 | 66,235 | 41,774 |
| Global Threat Reduction Initiative | 131,234 | 195,000 | — 1,775 | 193,225 | 219,641 |
| International Nuclear Fuel Bank ..... | ..... | 50,000 | — 455 | 49,545 | ..... |
| Congressional Directed Projects ..... | ..... | 7,500 | — 120 | 7,380 | ..... |
| Subtotal, Defense Nuclear Nonproliferation | 1,824,202 | 1,673,275 | — 15,279 | 1,657,996 | 1,247,966 |
| Use of Prior Year Balances ..... | ..... | ..... | ..... | ..... | — 918 |
| Total, Defense Nuclear Nonproliferation | 1,824,202 | 1,673,275 | — 15,279 | 1,657,996 | 1,247,048 |
| Rescission of Prior Year Balances .. | ..... | — 322,000 | ..... | — 322,000 | ..... |
| Total, Defense Nuclear Nonproliferation (OMB Scoring) | 1,824,202 | 1,351,275 | — 15,279 | 1,335,996 | 1,247,048 |

NOTES: The fiscal year 2007 Current Appropriation column includes additions for international contributions to the Elimination of Weapons-Grade Plutonium Production Program in the amount of \$5,397,964; to the International Nuclear Materials Protection and Cooperation Program in the amount of \$4,916,044 and to the Global Threat Reduction Initiative Program in the amount of \$1,738,800. Fiscal year 2008 adjustments reflect a rescission of \$15,279,000 as cited in the fiscal year 2008 Consolidated Appropriations Act (Public Law 110–161).

PUBLIC LAW AUTHORIZATION

**Fiscal Year 2008 Consolidated Appropriations Act (Public Law 110–161)
National Nuclear Security Administration Act, (Public Law 106–65), as Amended**

OUT-YEAR FUNDING PROFILE BY SUBPROGRAM

[In thousands of dollars]

| | Fiscal Year 2010 | Fiscal Year 2011 | Fiscal Year 2012 | Fiscal Year 2013 |
|--|------------------|------------------|------------------|------------------|
| Defense Nuclear Nonproliferation: | | | | |
| Nonproliferation and Verification Research and Development | 318,620 | 334,182 | 343,397 | 351,098 |
| Nonproliferation and International Security | 151,052 | 158,711 | 171,108 | 175,368 |
| International Nuclear Materials Protection and Cooperation | 400,511 | 394,626 | 395,225 | 404,064 |
| Elimination of Weapons Grade Plutonium Production | 24,507 | ..... | ..... | ..... |
| Fissile Materials Disposition | 37,691 | 27,985 | 28,435 | 26,000 |
| Global Threat Reduction Initiative | 150,299 | 161,074 | 173,172 | 177,452 |
| Total, Defense Nuclear Nonproliferation | 1,082,680 | 1,076,578 | 1,111,337 | 1,133,982 |

Senator DORGAN. Mr. Tobey, thank you very much. I did not indicate, and I should have at the outset, that we appreciate the aggressive initiatives you have undertaken. You have been able, when initiatives are presented, to move very quickly and be aggressive in those, and we appreciate that.

I want to ask a few questions and then call on my colleagues to inquire.

In your statement, Administrator Tobey, you say the possibility that rogue states or terrorists might acquire nuclear and other weapons of mass destruction and their related technologies, equipment, and expertise poses one of the most serious threats to the United States and international security. You say the continued pursuit of nuclear weapons by terrorists and states of concern underscores the urgency of NNSA's efforts to secure vulnerable weapons, et cetera.

First of all, I agree with that. I think there is an unbelievable danger out there in this world where a lot of rogue states and others wish to acquire nuclear weapons, and there is a lot of danger of someone acquiring one. You make the point that in order to do so you have got to have access to fissile material.

The urgency expressed in this paragraph I think is at odds with the budget request by the administration. And let me ask the question specifically. You will be spending less money this coming year than you did this current year if we agree with the President's budget request, substantially less money, frankly, hundreds of millions of dollars. And yet, you describe to us the urgency of this mission.

Now, I understand you come here as a requirement to support the President's request, but is there not a disconnect here with respect to the urgency and the request for less funding?

Mr. TOBEY. Mr. Chairman, I guess I would note, to some extent, some context which you actually noted at the start of your statement.

First of all, since September 11, our budget has roughly doubled for nonproliferation work. Given that initial ramp-up, which was quite steep and allowed us to accelerate our efforts, we have continued to try and put the budget on a generally upward slope, despite the fact that some of our efforts are actually shutting down. They are coming to completion because our work is done.

As you noted, if in fact you take into account what, as you also said was a complicated situation, whereby last year's congressional action actually took money that had been previously appropriated to our funds and took it away from a nonproliferation program, the Fissile Material Disposition program, it appeared to plus-up our budget when actually what it did was take money that had already been given to us and reprogram it for a different purpose.

If you take that into account, and the fact that money requested for the elimination of weapons-grade plutonium production is going down because our work is being completed as we shut down these reactors, and then also take out the one-time appropriation for the \$50 million for the IAEA nuclear fuel bank, our request is actually about flat with last year. That flat request I think does not reflect an indifference to the urgency of our work. I think it actually allows us to accelerate our work in our priority areas even as our work is coming to completion in areas like the elimination of weapons-grade plutonium production and the Bratislava Initiative.

Senator DORGAN. Mr. Tobey, that is a very deft answer. But I look at the proposal for future year appropriations—and it is true we had a jump after 9/11, but as I look at 2010, 2011, 2012, and 2013, the proposal here is essentially flat-funding. In fact, from 2009 to 2010, there would be a reduction; 2010 to 2011, a reduction. And my only point is that if there is urgency here, I do not think that funding request by the President squares with the urgency.

I note that Dr. Hecker and Dr. Bunn both point out in their written testimony that since the early to mid-1990s, the investment by DOE in nonproliferation safeguards, security technology experts, facilities, and so on has declined.

So this is not your budget. You are here to support the budget that you have been sent up here to support. But as one member of this subcommittee, I observe that I think there is not much that we do at this moment in the history of this country and what we face in the world than to attempt to stop the proliferation of nuclear weapons, keep them out of the hands of rogue nations and terrorists—there is not much more important than that because the detonation of one nuclear weapon in a major city anywhere in this world will have cataclysmic effects on life on this planet. So I just make that point that I think there is a disconnect here between the urgency and the funding.

A quick question, in your testimony, you referenced your office's work in overseeing the disablement and dismantlement of North Korea's nuclear weapons program. You mentioned the need for a legislative waiver of the Glenn Amendment restrictions that exist, as well as more substantial funding for that. Can you explain the Glenn Amendment restriction to us and your need for a waiver? And when must you have the waiver in place?

Mr. TOBEY. Sure. The Glenn Amendment prevents us from spending money in states that have conducted a nuclear test after a certain date. So, therefore, we are restricted from spending our funds to oversee the dismantlement or disablement of North Korean nuclear facilities.

We have been able to undertake that work through funding from the State Department, which does not have such restrictions. Be-

cause our DOE personnel have the expertise to oversee that, the State Department has essentially contracted with us to do that. But those funds are quite limited relative to the actual costs that would be necessary with the disablement and dismantlement of the North Korean nuclear facilities.

I must admit that it is somewhat uncertain what the exact time lines would be for that work. As you probably know, we have been waiting now for a period of months for North Korea's declaration, which I think would be a signal that we were actually going to move ahead. And as a consequence, we have not submitted, within our budget, those numbers because I could not guarantee that we would spend them.

What I can tell you is that our estimate, if we were to move ahead as fast as we could with disablement, in fiscal year 2008, our requirements would be roughly \$50 million, and in fiscal year 2009, it would be about \$360 million.

Now, I think it is also an open question as to exactly how those costs might be borne, and I would expect that we would be interested in seeing that perhaps some of the other of the six parties would be willing to pay for some of those costs. But I wanted to lay out, at least as we see it, what the objective facts are.

Senator DORGAN. I would be interested if you could give us some analysis. When you say \$360 million, how does that break down? I do not need it at the moment, but if you would just submit it to us, I would appreciate that.

Mr. TOBEY. Okay.

[The information follows:]

DPRK FUNDING BREAKDOWN

[In millions of dollars]

| | Fiscal Year 2008 | Fiscal Year 2009 |
|--|------------------|------------------|
| By Office: | | |
| NA-21 | 30 | 260 |
| NA-24 | 20 | 100 |
| Total | 50 | 360 |
| By Function: | | |
| Material Packaging Preparation | 30 | 95 |
| Material Packaging and Transport | | 165 |
| Disablement and Dismantlement | 12 | 43 |
| Verification | 4.5 | 44.5 |
| Health, Safety, and the IAEA | 3.5 | 12.5 |

Senator DORGAN. Senator Domenici?

Senator DOMENICI. Thank you very much, Mr. Chairman.

Mr. Tobey, my memory slips me. What are the countries that are involved in the North Korean action?

Mr. TOBEY. The Six Parties are North Korea, China, Russia, Japan, the Republic of Korea, and the United States.

Senator DOMENICI. Well, there is not any question with this Senator that we should not be bearing the entire monetary costs. It looks to me like Japan and even South Korea—they are not party to it. Are they? Is South Korea a party to it? Is South Korea one of the six countries?

Mr. TOBEY. Yes.

Senator DOMENICI. They can well afford and it is very important to them. So I hope we hear from those in the position of working on this that the United States is at least trying in these difficult budget days to ask others to pay some of it.

Despite occasional problems, the dismantling of the North Korean plutonium production infrastructure continues under these six party talks. If a breakthrough occurred and all the expected facilities decommissioned and materials were removed and verification activities were implemented, is that a definition of the project that would cost that \$300 million-plus?

Mr. TOBEY. No. That would apply simply to the disablement of the facilities at Yongbyon. There may well be other facilities that would require dismantlement.

Senator DOMENICI. And that would just be more money.

Mr. TOBEY. Correct.

Senator DOMENICI. You would assume the same kind of imposition on others of partial costs would be the order of the day.

Mr. TOBEY. We have undertaken this diplomatic effort as a partnership with other countries. It would make sense to me that other countries would bear a part of those costs. And certainly that has been the case with respect to, for example, shipments of heavy fuel oil that have gone to North Korea.

Senator DOMENICI. Last week the Intelligence Committee received briefings, and some of us received them also as members of Armed Services or otherwise on North Korea's nuclear assistance to Syria. Apparently North Korea was helping Syria build a clandestine nuclear reactor until Israel destroyed the facility in the arid desert. Have we obtained any assurance from North Korea that it will stop exporting nuclear technology?

Mr. TOBEY. I am unaware of an assurance at this point. Obviously, that would be a priority of ours within the talks.

Senator DOMENICI. Well, it seems to me kind of strange that we would be thinking that their talks with us were reliable, while at the same time they were reaching the spirit of everything by helping Syria directly. Does this create any kind of concern on your part as an American representative that that is going on?

Mr. TOBEY. Absolutely, sir.

Senator DOMENICI. And nothing can be done about it I assume.

Mr. TOBEY. I think it is a matter of very serious concern, and I think it is an issue that will need to be resolved before we can be confident that the North Korean nuclear matter has been resolved.

Senator DOMENICI. Did North Korea violate any agreements in providing this assistance that you know of?

Mr. TOBEY. I should caveat this with the notion that I am not a lawyer, and we are only beginning to look at some of these issues. But my understanding is that North Korea has withdrawn from the NPT. What may have gone on in Syria could well be a legal issue with respect to the NPT and Syria, and there are, of course, United Nations Security Council resolutions that were enacted with respect to North Korea in the wake of their nuclear test, essentially prohibiting certain forms of trade to include nuclear trade.

Senator DOMENICI. I am going to leave that area and ask the chairman—I have some questions regarding Russia's participation and how much they should pay these days.

Would you like to hear from some other Senators first? That would be all right with me.

Senator DORGAN. We will come back.

Senator Feinstein?

Senator FEINSTEIN. Thank you very much, Mr. Chairman.

Mr. Tobey, you and I both heard Dr. Hecker speak last evening at the Nuclear Threat Initiative where he pointed out in his five trips to look at the reactors in North Korea, that Yongbyon had been effectively disabled and two other reactors dismantled. He also indicated that the North Koreans had sent several signals through him to us that they were interested in cooperating.

How do you assess the level of North Korean cooperation at this point with the remaining dismantlement issue?

Mr. TOBEY. In terms of the narrow question of disablement which, as you have noted, there are DOE people at Yongbyon overseeing, the cooperation has generally been good, but has slowed recently from what it could be. But Yongbyon, of course, is not the whole story. The North Korean declaration would necessarily deal with facilities beyond Yongbyon, facilities and activities beyond what goes on at Yongbyon. And so far we have not seen a lot of progress in that regard.

Senator FEINSTEIN. Are you, in essence, saying that they are not cooperative with respect to—I do not know if you want to put forward in this setting what the remaining complications are, but if you do, I think it would be useful for the committee to hear them.

Mr. TOBEY. I think it is yet to be seen. I think we will need to see a North Korean declaration to know how serious they are about their September 19, 2005 commitment to abandon all their nuclear weapons and existing nuclear programs.

Senator FEINSTEIN. So you are saying then that there are other facilities in addition to these that are up and functioning, in other words, with fissile materials?

Mr. TOBEY. Well, I am inferring, to some extent. We know, for example, that they conducted a nuclear test. That test was not conducted at the Yongbyon site. They have, I think, talked in the past about uranium production facilities, mining, et cetera, which also would not be at the Yongbyon site. Clearly, there were some efforts at weaponization, which likely were not at the Yongbyon site.

Senator FEINSTEIN. Thank you very much.

Let me go to the International Atomic Energy Agency. I strongly support the IAEA. I support its mission. I think it is important. I think in the world of the future it is only going to grow more important.

My question is why are we behind on paying our dues?

Mr. TOBEY. Well, we are a strong supporter of the IAEA as well, and as you probably know, we are the largest single contributor to the IAEA. The dues, I think, are largely paid from—although there are some DOE funds that go to the IAEA—the dues are largely paid by the State Department.

Senator FEINSTEIN. So do you know why we are behind?

Mr. TOBEY. I am sorry, Senator. I do not know.

Senator FEINSTEIN. Thank you.

The third question—I still have some time—is Pakistan. Pakistan possesses nuclear weapons. It has an unstable government and a dramatic rise of Islamic fundamentalism. Many people have called it Ground Zero as far as terror is concerned. If you ask some of us what is the most threatening nuclear situation, we would have to say it is Pakistan in terms of those nuclear facilities.

The question I have is what steps can we take to confront this challenge to see that the weapons remain secure and to actually improve the situation in terms of stability of government and therefore stability of the nuclear weapons program.

Mr. TOBEY. We have extended an invitation to Pakistan to join the Global Initiative to Combat Nuclear Terrorism, which they have done. They have participated in a Global Initiative exercise in China. That initiative is aimed at drawing together nations to share best practices, essentially throughout the possible prevention and response cycle for, for example, security practices to prevent the loss of fissile material, emergency response actions to try and recover it, customs and border guards, et cetera. And we are hopeful that Pakistan will avail itself of this opportunity to ensure that they have the best practices possible.

I regard their military as both professional and committed to nuclear security.

Senator FEINSTEIN. My time is up. Thank you very much, Mr. Chairman.

Senator DORGAN. Senator Allard?

Senator ALLARD. Thank you, Mr. Chairman. I would like to start off with a question on the nuclear detonation detection program. We rely heavily on our space assets to implement that program, and we are getting a greater concern, I think, from a number of agencies about the risk that our space assets are being placed in, particularly in light of the fact that China had demonstrated their ability to knock out a satellite. They did their own.

What kind of effort are you making sure to try and protect those assets that we rely so much on our nuclear detonation?

Mr. TOBEY. Senator, as you might imagine, the details of how we might protect such systems pretty quickly get into classified material.

Senator ALLARD. What I need to know is; are you working with other agencies to look at that problem?

Mr. TOBEY. Yes, sir. I would note that diversifying, if you will, proliferating our ability to detect such detonations is an important response. If we have redundancy in our ability, it makes it more difficult for another nation to eliminate that capability.

Senator ALLARD. I just wanted to have some assurance that you were looking at this risk.

Mr. TOBEY. We regard this as a very high priority.

Senator ALLARD. I realize that the details of it would be something that we would not want to talk about in a setting like this, but just your assurance that you have looked at it. I think it does not hurt to let people know that we have some vulnerability out there and they do affect our ability to determine whether other countries are keeping their agreement as far as nuclear weapons agreements are concerned at least.

My understanding is that the language on the Glenn amendment—attempts are being made to put that in the supplemental bill. Is that correct?

Mr. TOBEY. That is my understanding, Senator.

Senator ALLARD. And why are we selecting the supplemental bill as opposed to the regular appropriation bill? Does it have to do with timing or does it have to do with sort of an aversion to the regular appropriation process?

Mr. TOBEY. I confess that that decision was not mine. I am not an expert in legislative procedure. I think it was done in consultation with people on the Hill. I think that was chosen as the most immediate and likely vehicle to pass.

Senator ALLARD. It is important that we deal with this language, the sooner, the better.

Mr. TOBEY. I think in terms of minimizing risk, we would not be able to go forward if there is not diplomatic progress, so the sooner, the better. But I cannot say to you that tomorrow we will be able to do all that we would wish to do in North Korea. It is difficult to predict.

Senator ALLARD. Now, let us just assume that we grant the waiver in a supplemental appropriation bill, and phase 3 work begins as quickly as possible. When would you anticipate completion of phase 3 in a best case scenario?

Mr. TOBEY. Completion of phase 3 would probably be a period of years. Even the completion of phase 2 would—

Senator ALLARD. Five years, 10 years, decades?

Mr. TOBEY. I would say about 5 years would be fair. Much depends on the level of cooperation with North Korea, and it is difficult to predict.

Senator ALLARD. Yes, I understand.

Mr. TOBEY. The canning campaign and even the work that we have undertaken now has varied significantly according to the level of cooperation that the North Koreans have—but even the current phase, in terms of the fuel that is in the reactor now and dealing with that, would likely take the balance of this year.

Senator ALLARD. Now, I would like to move on to the fissile materials deposition. That is irradiation of plutonium. It was in the 2000 agreement. How far along are we in reaching the 2000 agreement, and what percentage is the United States responsible for disposing of? Can you share that with us?

Mr. TOBEY. As you know, I am sure, sir, the 2000 Plutonium Management and Disposition Agreement provided for the disposition of 34 metric tons each by the United States and Russia.

Senator ALLARD. Right.

Mr. TOBEY. Frankly, not a lot of progress had been made up until a couple of years ago. Neither the United States nor Russia seemed to have set on a disposition path.

About a year ago, some Members of Congress had asked us to undertake three activities. One, make sure that our baseline was credible and defensible for the facility that we are building in South Carolina. I believe that we have done that. We have set a baseline. We brought in the preconstruction activities under that baseline and slightly ahead of time.

Senator ALLARD. This is the MOX-plus?

Mr. TOBEY. The MOX facility, exactly.

And we have significant contingency and reserves. 90 percent of the design is complete, which is very, very high for a facility of this size at this stage of construction. Construction began on August 1. So it is well underway. I think our path is pretty clear.

The second thing that I understood Congress to ask us to do was to look at additional missions for the facility. We found three potential additional missions, and we are in a position to execute those missions if there is a decision to do so. We do not need to make that decision today, even under optimal circumstances. But they would add substantially to the mission of the facility, disposing of perhaps 50 percent, maybe even more, additional material; making it a much more cost effective project.

And then third, they asked us to try and get the Russian program in order. Secretary Bodman and Rosatom Director Kiriienko signed a joint statement several months ago that provides for what we believe is a technically and financially credible path for the Russian disposition of plutonium, using fast reactors. I think it is key to understand that the Russian path is consistent with their own energy plans and, therefore, is more likely to be pursued, not out of a sense of obligation or because we blindly trust what they are doing, but out of Russian self-interest.

Senator ALLARD. Thank you. My time is expired.

Senator DORGAN. Senator Domenici, do you have some additional questions about Russia?

Senator DOMENICI. Yes, I do.

I did not understand your answer when you talked about additional work or missions for the MOX facility. What are you talking about?

Mr. TOBEY. The Department will use the U.S. MOX facility to dispose of at least 34 metric tons of surplus weapon-grade plutonium oxide, which includes both nuclear weapons pits and certain other non-pit plutonium metal and oxide material. As described in a technical report that the Department submitted to Congress in July 2007, the Department is also considering sending additional plutonium from nuclear weapons pits declared surplus to national security needs, and additional amounts of non-pit plutonium, pending further environmental and technical analysis and final decisions by the Department. Also, as described in the July 2007 technical report, the facility may provide an option to fabricate initial core loads for fast reactors to support the Global Nuclear Energy Partnership, depending on analysis and decisions which could optimally be made well into the future.

Senator DOMENICI. I am glad to hear that there are other missions, and we are very fortunate that we struck a deal with the Russians. Even though they did not live up to their side, it got us off our duff and we started the MOX program, about 25 years late or 30, but that is pretty good.

Let me ask you on the Russian assistance. Since 1992, the U.S. Government has spent nearly \$10 billion on the Nunn-Lugar-Domenici program on efforts to improve controls on nuclear weapons materials and expertise. Most of it has been spent in Russia. As security upgrades are completed and material returned or eliminated, where does the program go from here?

Russia now has a budget surplus as a result of oil and gas exports. What is NNSA doing to try to see that Russia pays its share of the nonproliferation costs for securing its material? And I will ask Dr. Bunn some questions on that subject. Could you answer that part?

Mr. TOBEY. Certainly, sir, I will try. We have made clear to the Russians that Congress has directed that our work will end in 2012. So they are on fair warning that in 2012, U.S. nuclear material security efforts in Russia will end. And we expect them to sustain the efforts that we have put into place. As you noted, our investments have been substantial. NNSA's will be about \$2 billion.

We have begun to compare with the Russians budgets for the first time, to my knowledge anyway. When I sat down with our Russian counterpart who works for the 12th GUMO, Lieutenant General Verkhovtsev, he told us about his budget request for sustaining nuclear material security upgrades. He assured us that he had gotten what he had requested. I think that level will have to go up if it is going to truly be sustained, but for the first time, we are beginning to compare our budgets so that as we draw down toward that 2012 mark, they recognize they will need to step up in order to ensure that the investment that we have made in nuclear security is sustained.

I would also note that we are making some progress on cost sharing in other ways, so for example, the agreement that we signed with them to accelerate radiation detectors at Russian border crossings provides for Russia bearing half the costs of those installations.

Senator DOMENICI. Well, I just would like—since you indicated I have been very active in this whole area—it is correct. I do want to express my thoughts even though I have only about 8 months left here. I believe that insisting that Russia pay the maximum amount as their share on these programs seems to me to be important if we are going to maintain the programs because I think with us having very unbalanced budgets, borrowing money in huge quantities to keep our Government going and Russia being very solvent, I think a couple of these programs would die on the floor of the Senate if somebody brought that subject up and said this is no longer fair. So I just urge that wherever we can, the Russians be asked to pay their share.

It was not the case when we started. We paid for all of it, the early programs that Sig Hecker is aware of, the cameras that were purchased for them and the facilities so they would have doors that were reliable instead of open, hanging things. You remember that? We paid for all that. And I guess that was right. It was probably good money spent.

Mr. TOBEY. Senator, I certainly agree with all of that, and we are working in that direction. I would note though that just because a Russian oil company is flush with cash—and they are—does not necessarily mean that nuclear institutes in the Urals are flush with cash. And we spend the money there because it is in our interest.

Senator DOMENICI. I understand.

Mr. TOBEY. I know you know this. I just wanted to make absolutely clear for others that we do this because it is in our interest that Russian nuclear weapons material be secured.

Senator DOMENICI. Well, there is no question it is in our interest. We know that. I have been a staunch advocate. Sometimes nobody objected. Sometimes they did not even ask a question on the floor about us using this money.

But I am just telling you what I think on the future, and I think the Russians understand. And I know they have budgets that come from the big central headquarters and they do not always get what they need, but that is really not an excuse for an adequate match and adequate payment because they would pay it from central headquarters if they knew we were not, if they were serious about nonproliferation.

Last year Congress approved an increase of \$125 million above the request for nonproliferation and verification research and directed you to invest \$20 million toward the building of a laboratory scientific capability. It appears that this direction has not been followed. How was the money spent and what long-term capability has NNSA invested in at the labs?

Mr. TOBEY. Sir, we have paid close attention to that direction, and I actually do have a list of investments. I have talked to your staff about this, and I admit that we had not provided the level of detail that would make this clear. But I brought with me today that level of detail, and I would be happy to provide it.

Senator DOMENICI. Will you please furnish it?

[The information follows:]

NONPROLIFERATION AND VERIFICATION R&D—FISCAL YEAR 2008—\$133 MILLION
PLUS-UP SPEND PLAN

- \$25.0 million PNNL Area 300 (subject to 1 percent rescission)—spent on balance of construction (PSF) and completion of the Foundation/Steel contract.
- \$20.5 million.—“an additional \$20.5 million is provided for nuclear explosion monitoring” (subject to 1 percent rescission).
- \$5 million.—“The Department is directed to conduct a competitive solicitation open to all Federal and non-Federal entities toward an integrated suite of research, technology development and demonstration areas including infrasound, hydro acoustics for ground based systems treaty monitoring activities. The competitive process should award not less than \$5 million of the additional funding for nuclear explosion monitoring for research and development for ground-based treaty monitoring.”
- \$2.5 million.—For national laboratory seismic calibrations of threat regions and radionuclide system activities.
- \$2.0 million.—Detonation forensics technology and related base science activities.
- \$11.0 million.—Space-based nuclear detonation detection system R&D.
- \$20.0 million “for the implementation of a sustained research and development capability in nuclear detection and nuclear materials security” (subject to 1 percent rescission).
- \$10.0 million Radiation Detection R&D.
- \$5.0 million Radiation Detection Materials R&D.
- \$5.0 million Nuclear Material Security R&D (supporting nuclear safeguards (NA-24) and alternate source development (NA-21)).
- \$60.0 million “in proliferation detection to expand research in critical research and development for high-risk, high return nuclear detection capabilities” (subject to 1 percent rescission).
- \$5.0 million, Small Business Innovation Research taxes.
- \$1.0 million, foreign nuclear weaponization detection R&D program, Goals, Objectives and Requirements and technology road-mapping process.
- \$0.5 million Hf-178 project at request of SASC.

- \$20 million University basic research.
- \$9 million Testing and Evaluation, including upgrade of infrastructure at Nevada Test Site.
- \$22.26 million, fully fund fiscal year 2008 projects/re-capitalization and equipment purchases at National Labs.
- \$7.5 million Earmarks (subject to 1.6 percent rescission).
- \$3.0 million GMU.
- \$1.5 million New England Research.
- \$2.0 million TAMU/NSSPI.
- \$1.0 million ODIS.

Mr. TOBEY. Mr. Chairman, I would like to put in the record, for purposes of the committee's use, a chart on nonproliferation funding just because I want it to be noted that we moved the MOX program, which is about \$500 million. We moved it from nonproliferation to another part of our budget, and that did change the congressional funding line substantially. But it does not mean we did less. It is just that we did not put MOX in the nonproliferation category. Maybe it belongs there but we took it out and put it somewhere else.

Senator DOMENICI. That is my last question. I will submit some in writing.

I want to thank you for all the work you have done, and I wish you well especially in the North Korean situation. I just cannot believe, with everything everyone knows about what they are doing and the fact that they are going to have to do something in their self-interest soon to get help—and I am sure of that. We have to keep the pressure on some way and get it done. Thank you.

Mr. TOBEY. Thank you, sir.

Senator DOMENICI. Thank you, Mr. Chairman.

Senator DORGAN. Senator Domenici, thank you.

I believe Senator Feinstein has one additional question?

Senator FEINSTEIN. One additional question.

Mr. Tobey, Dr. Bunn in his statement states a goal that I think is a very good one, and he says, "Our goal should be to remove all nuclear material from the world's most vulnerable sites and ensure effective security wherever material must remain within 4 years." Now, that is a quote, but I think it is a worthy goal.

How does this budget help us achieve that? I can ask this in writing too. What more needs to be done? What additional resources are necessary in what areas, and how would a verifiable global treaty ending production of nuclear materials for weapons complement this effort?

If you can answer any of it offhand, that would be great. I would like to send this to you in writing.

Mr. TOBEY. I would be happy to give you a fuller answer.

Senator FEINSTEIN. Good.

Mr. TOBEY. I can offer an answer to at least some of that.

First of all, as I mentioned earlier, we are mindful of the suggestions that Matt Bunn makes and we will certainly take a hard look at whether or not we can achieve that goal. I would argue that we actually do take significant steps toward it with this budget in several ways.

First of all, we continue our acceleration of the conversion of HEU reactors to LEU and the repatriation of fuel. I know that has been a concern of his, and over the last year or two, we have picked

up the pace, in part in response to some of the suggestions that he has made.

We also will continue our work to secure nuclear weapons material in Russia, completing the security upgrades under the Bratislava Initiative, and extending actually beyond that to a few sites that we have received since then. I regard that as, frankly, further evidence of success because it shows that the cooperation in Russia is even more extensive than it had been in the past.

And then we will also be working in other ways to minimize the use of highly enriched uranium. So, for example, we are looking at development of new fuels that will allow the conversion of the final set of reactors that will require a somewhat different type of fuel.

Senator FEINSTEIN. Thank you. That is very helpful. We will put it in writing too in any event. Thank you.

Thank you, Mr. Chairman.

Senator DORGAN. Administrator Tobey, thank you very much for your work and thank you for being with us today. We appreciate your testimony.

Mr. TOBEY. Thank you, Mr. Chairman.

Senator DORGAN. We look forward to continuing to work with you.

NONDEPARTMENTAL WITNESSES

STATEMENT OF DR. SIEGFRIED S. HECKER, CO-DIRECTOR, CENTER FOR INTERNATIONAL SECURITY AND COOPERATION, STANFORD UNIVERSITY

Senator DORGAN. Next we will ask our other two panelists to come forward, Dr. Matthew Bunn, who is a senior research associate at the Belfer Center for Science and International Affairs at the John K. Kennedy School of Government at Harvard University. He will be joined by Dr. Siegfried Hecker, the co-director of the Center for International Security and Cooperation at Stanford University.

This committee appreciates the work that both of you do, and we will ask you to proceed. Dr. Hecker, would you proceed first and then Dr. Bunn? And then we will inquire. As I indicated previously, your entire statement will be made a part of the permanent record and you may summarize.

Dr. HECKER. Thank you, Chairman Dorgan, Senator Domenici, Senator Feinstein, and Senator Allard. It is a great pleasure to be here, and thank you for inviting me to comment on the National Nuclear Security Administration's defense nuclear nonproliferation program and its 2009 budget.

Thank you for admitting my written statement. What I will do is to briefly summarize the three main points that I have in my statement.

But let me first say that my opinions have been shaped by 34 years at the Los Alamos National Laboratory and nearly 20 years of practicing nonproliferation with my feet on the ground in places like Russia, China, India, and North Korea and Kazakhstan. And I must say that much of this I have done with the strong encouragement and support of Senator Domenici, and I thank him for that over the years.

My first point is that—and this has really been covered in great detail by all of your statements, but just to reiterate my point—the proliferation of nuclear weapons and weapons capability is growing. Today, as you have indicated, we face the threat from North Korea, nuclear ambitions in Iran, the nuclear puzzle in Syria, and the recently nuclear-armed states in Pakistan and India. We have an improved but not satisfactory nuclear security situation in Russia and the other states of the former Soviet Union. The danger of nuclear terrorism is real.

But this is not a fight that the United States can win alone. We cannot simply push back the dangers beyond our own borders. It is imperative that we forge effective global partnerships to combat the threat of nuclear terrorism and the proliferation of nuclear weapons. And meeting these challenges requires diplomatic initiative and technical cooperation. The United States must lead in that

diplomacy and the DOE/NNSA must provide the technical leadership and capabilities.

The NNSA has done a commendable job in nuclear threat reduction and in combating nuclear proliferation. However, as you have also indicated, my own sense is that these activities are not commensurate with the magnitude of the urgency of the threat that we face today. So I very much agree with the sentiment that you have expressed.

A second point is cooperative threat reduction, as was already indicated, began with Nunn-Lugar, followed by Nunn-Lugar-Domenici legislation, directed at the aftermath of the breakup of the Soviet Union. We must stay engaged with Russia and the other states of the Soviet Union. Much progress has been made, but more needs to be done. We have to change the nature of the relationship to one in which Russia carries more of the burden. So, Senator Domenici, I very much agree with your comment. However, we must also make sure that we continue to have a seat at the table, and to do that requires some investments of our fund to do so to make certain that the Russians actually work in the areas that are also still very much in our common interests.

We should also expand the cooperative reduction programs aggressively to countries that require technical or financial assistance. The nuclear threat exists wherever nuclear materials exist. These materials cannot be eliminated, but they can be secured and they can be safeguarded. We should more strongly support the IAEA and provide support for countries, for example, that try to implement the U.N. Security Council Resolution 1540 to prevent nuclear terrorism.

But mostly, Mr. Chairman, in the spirit of what you said in your opening statement, as we look back in the future to what should we have done today, I look back to the early 1990s when we at the laboratory and the nonproliferation communities had an enormous number of ideas as to what to do when the Soviet Union breaks up. And similarly now, we must be equally creative in looking out and seeing what should we be doing. The ideas are out there, and it is a matter of making sure that we encourage them.

But we must also enlist the other nations such as China, India, and for that matter, Russia to build a strong global partnership to prevent proliferation and nuclear terrorism. India and China have, for the most part, sat on the sidelines while the United States has led this fight. And Russia has not engaged commensurate internationally with its nuclear status. And these efforts are particularly important today as we look at the potential renaissance of global nuclear power.

And the third point that I want to make is that the hallmark of all of these efforts of global cooperation must be technology partnership and an in-country presence. The DOE/NNSA has the principal expertise in this country in its laboratories across the complex. It should be applauded for sending its technical experts around the world, often in very difficult situations. And I must tell you just this past February, in fact, on Valentine's Day, I ran into the DOE contingent in North Korea in Yongbyon on a bitterly cold day. They were not out there for a party.

However, there are both structural reasons and budgetary shortfalls that we find today that that talent that we rely on is actually fading away. And the issue that I want to make sure that I put on the table is that, of course, budgets are extremely important, but budgets are not everything. We do not have in place today the necessary personnel recruitment. We have no longer the working environment in the laboratories or the pipeline of students from the universities to replenish the talent to do that job. So the working environment, the research environment of these laboratories is also crucial, along with appropriate budgetary support. So I strongly support the NNSA Next Generation Safeguards Initiative which is aimed at tackling this problem as to what does one do about the capabilities in our laboratory system.

Mr. Chairman, when I first visited Russia's secret cities in 1992, shortly after the fall of the Soviet Union, I feared that its collapse may trigger a nuclear catastrophe. The fact that nothing really terrible has happened in the intervening 16 years is in great part due to the DOE/NNSA programs that you are considering here today. And we must be just as innovative now, as I had indicated, and just as creative to deal with the threat that has changed dramatically since 1992.

PREPARED STATEMENT

Now, since I see my time is up, in my statement I also mention the implications of recent trips to North Korea. As has been pointed out, I have been there five times over the past 4 years, and I was also recently in India. But since I am out of time, I will leave those for your questions.

Thank you for your attention.

[The statement follows:]

PREPARED STATEMENT OF DR. SIEGFRIED S. HECKER

Thank you Chairman Dorgan, Senator Domenici and distinguished members of the committee for giving me the opportunity to comment on the National Nuclear Security Administration's Defense Nuclear Nonproliferation programs and 2009 budget request.

Today I would like to make three points:

- Nuclear threat reduction continues to be one of the highest U.S. national security priorities. Unfortunately, the threat has become more complex and challenging since threat reduction programs began in 1992 with Russia and other states of the former Soviet Union. Today, we face a nuclear threat in North Korea, nuclear ambitions in Iran, a nuclear puzzle in Syria, recently nuclear-armed states in Pakistan and India, and an improved, but not satisfactory, nuclear security situation in Russia and other states of the former Soviet Union. Moreover, global energy and climate forces have brought about a resurgence of interest in commercial nuclear power that places additional demands on the threat reduction agenda. I favor a significant expansion of DOE/NNSA's programs in these areas beyond the President's budget request.
- The greatest threats we face today are a breakdown of the nonproliferation regime and the possibility that terrorists may acquire nuclear weapons or fissile materials. To keep the most dangerous materials out of the hands of the world's most dangerous people requires a global network of nations that are committed to and capable of securing their own nuclear materials, preventing export, and are committed to nonproliferation. We must aggressively expand cooperative threat reduction programs to nations that require either technical or financial assistance and enlist those countries that have the technical and financial resources, but have historically played either a limited or no role in international nonproliferation efforts—namely, Russia, China and India. The hallmark of such cooperation must be partnership, technology and in-country presence.

—Nuclear threat reduction and nonproliferation efforts must have strong technical underpinnings and participation. The close interplay of technology and diplomacy is crucial to effective policy and implementation. The NNSA and its laboratories represent the primary technical talent in these areas. Unfortunately, financial support and the nuclear research environment are insufficient to meet the challenges confronting us. I strongly support the DOE/NNSA Next Generation Safeguards Initiative and other efforts aimed at attracting more technical talent to these important areas.

Mr. Chairman, you requested that I comment on the adequacy of the President's fiscal year 2009 budget request for the National Nuclear Security Administration nuclear weapon nonproliferation efforts as well as the sufficiency of those efforts generally. The committee staff also requested that I comment on the broader policy issues, including on my recent visits to North Korea and India and what we should be doing to secure fissile materials around the world. I will touch on those subjects briefly and attach two articles that deal with some of these issues in greater detail.

THE BUDGET AND ADEQUACY OF THE DEFENSE NONPROLIFERATION PROGRAMS

I will restrict my comments to the big budgetary picture. The overall budget request is modest compared to the importance and impact of NNSA's nonproliferation efforts. I recognize the demands on the Federal budget, yet the amount of money spent on these programs is small compared to dealing with the consequences of failure in any of its elements.

I strongly support NNSA's comprehensive effort to deal with nuclear threats and steps that it has taken to tailor its programs to the changing nature of the threats. Nevertheless, I believe we need a greater sense of urgency in completing some of the ongoing efforts and in launching new ones with adequate budgetary support.

The greatest threats we face today are a breakdown of the nonproliferation regime and the possibility that terrorists may acquire nuclear weapons or fissile materials. The most immediate challenges are North Korea and Iran. However, the recent developments in Syria demonstrate that efforts to acquire the bomb are more widespread than believed. The importance of keeping fissile materials out of the hands of terrorists is generally appreciated; the technical difficulty of doing so is not. I describe the technical challenges in detail in Attachment I. In addition, the resurgence of nuclear power, necessary to combat the world's energy and environmental crisis, must be supported by enhanced nonproliferation efforts if it is to succeed.

CHANGING PARTNERSHIP WITH RUSSIA

The nuclear threat changed dramatically with the end of the Cold War and the breakup of the Soviet Union. We came to be threatened more by Russia's weakness than its strength. Nunn-Lugar legislation followed by Nunn-Lugar-Domenici legislation established the Cooperative Threat Reduction program aimed primarily at Russia and the other states of the former Soviet Union. This innovative approach of working cooperatively with these nations helped them deal with the unprecedented situation of how to provide security for an enormous arsenal of nuclear weapons and an equally huge stockpile of fissile (bomb-grade) material in states that changed their political and economic systems dramatically, and whose centrally-controlled institutions collapsed almost overnight. Much progress has been made in helping Russia and the other states improve the security of their nuclear weapons and materials. Most importantly, nothing really terrible has happened in the Russian nuclear complex in the 16 years since the breakup of the Soviet Union.

However, much remains to be done. My colleague, Dr. Matthew Bunn, who is also testifying today, has provided detailed annual status reports of accomplishments and challenges. I want to provide a perspective based on my many visits to the Russian nuclear complex since 1992. As director of the Los Alamos National Laboratory at the time, I visited the closed and formerly secret cities housing Russia's nuclear weapons laboratories in February 1992. The nuclear facilities and materials that were previously protected by guns and guards were now vulnerable. We developed scientific collaborations to build trust, which allowed us, 2 years later, to sign the first contracts with three Russian institutions for materials protection, control and accounting (MPC&A) cooperation. This lab-to-lab program helped Russia begin to develop a modern system of protection and safeguards to secure its nuclear materials. Our focus was always that it is in their best interest to secure their own materials. The responsibility is theirs; all we can do is help. We helped them expand this program to the Russian nuclear navy and the civilian sector. We then also expanded the program to some of the other states of the former Soviet Union. With Senator Domenici's help, we tackled the problem of helping Russia secure its nuclear knowledge by engaging Russian technical specialists in various civilian research and in-

dustrial projects to help in the massive worker reorientation challenge the Russian nuclear complex faced. These programs have recently come under unjust criticism by the Government Accountability Office. It was critical to augment the hardware-oriented technology programs with people-oriented efforts to enhance nuclear security.

Much of the focus on the MPC&A program with Russia has been to complete physical security upgrades. This phase of the program is nearing completion. Together with the general tightening of security during the Putin administration, these efforts have greatly improved the current nuclear security situation in Russia. The focus of U.S. efforts must now shift to the much more difficult problem of having the Russian complex sustain these security improvements and to develop better practices in the control and accounting of nuclear materials. Progress has been slow, partially because Russia has reverted to the Soviet practice of relying mostly on physical security and secrecy, and partly because Russia has a very different view of its vulnerabilities than we do. Russian practices reflect the belief that the Chechen rebels pose the greatest threat. Much less attention is paid to a potential insider threat.

A different approach to cooperative threat reduction will be required to make additional progress with the Russian nuclear complex. Money will be less important, but not irrelevant. In the 1990s, U.S. financial support was imperative. Today, thanks to oil prices of nearly \$120 a barrel, Russia has a large budget surplus. Yet, if the United States is to continue to influence Russian security and nonproliferation practices, it will need to continue to invest some funds to have such influence. Once Russia completes the current round of facility security upgrades with NNSA support, then I recommend that NNSA support its laboratories to conduct a broad range of cooperative programs with the Russian nuclear complex. Some programs will have direct security implications—for example, continued work on best practices for MPC&A (especially control and accounting), promoting a security culture, eliminating the use of highly enriched uranium (HEU) in civilian applications, instrumentation development for nuclear detection and forensics, nuclear attribution, nuclear materials registries and databases, regulations and practices to protect radiation sources, emergency response to nuclear incidents, and proliferation resistant reactors and fuel cycle research. Other programs will have indirect, but still important, benefits—for example, nuclear energy R&D, environmental R&D, fundamental research in nuclear materials, radiochemistry and analytical chemistry techniques. We must also continue to encourage Russia to eliminate much of its surplus stock of fissile materials and to consolidate its still massive nuclear complex. In summary, we should strengthen and broaden our nonproliferation collaboration with Russia by supporting our own technical specialists to work with Russian technical counterparts. We should phase out direct financial support to Russia except in those cases where the investment is necessary to keep it meaningfully engaged.

EXPANDING COOPERATIVE THREAT REDUCTION BEYOND RUSSIA

I applaud the NNSA efforts to expand its nonproliferation activities and threat reduction programs beyond Russia. These programs in the other states of the former Soviet Union have significantly reduced the global nuclear threat. The breakup of the Soviet Union created four nuclear weapons states out of one. The CTR program reversed that dangerous situation by getting Ukraine, Kazakhstan and Belarus to return Soviet nuclear weapons to Russia by 1996. However, these states also had considerable inventories of nuclear materials and a robust nuclear infrastructure that was largely left in place. Similarly, other states such as Uzbekistan and Georgia had nuclear materials and nuclear facilities. The former Soviet satellite states in Eastern Europe also had vulnerable nuclear materials and facilities. NNSA cooperative programs in these countries have reduced, but not eliminated, the threat. These programs should be expanded and molded into longer-term partnerships with these states to help them manage their nuclear dangers while also getting the benefits of civilian nuclear applications.

The NNSA also correctly assessed the need for cooperative nuclear threat reduction beyond the borders of the former Soviet Union. To keep the most dangerous materials out of the hands of the world's most dangerous people requires a global network of nations that are committed to and capable of securing their own nuclear materials and preventing export. There are approximately 40 countries that possess either nuclear materials or the necessary nuclear infrastructure to produce nuclear materials. There are more than 100 countries that use ionizing radiation sources (for medicine, industry, agriculture or research) that could fuel a radiological dispersal device; the so-called dirty bomb. Whereas the importance of securing nuclear materials is generally appreciated today, the technical difficulty is not. In Attach-

ment I to this testimony I detail why this is much more difficult than simply locking up these materials the way we guard gold at Fort Knox.

The technical components of global security initiatives are crucial. To secure nuclear materials requires global partnerships and global reach. The DOE/NNSA and its laboratories are in the best position to develop such partnerships. I recommend a two-pronged approach: (1) Aggressively expand cooperative threat reduction to countries that require either technical or financial assistance; and (2) Enlist those countries that have the technical and financial resources; but have historically played either a limited or no role in international nonproliferation efforts. In both cases, cooperation with the International Atomic Energy Agency (IAEA) is imperative.

Aggressively Expand Cooperative Nuclear Threat Reduction Globally.—The NNSA Global Threat Reduction Initiative has made significant gains in securing or removing highly enriched uranium from research reactors and research facilities in countries that had difficulty securing it. For example, partnerships between host countries, the United States, Russia and the IAEA resulted in the repatriation of HEU from Romania, Bulgaria, Uzbekistan and other countries to Russia. In many cases, the NNSA has helped to convert research reactors to operate with low enriched uranium to remove the proliferation risk and allow the removal of HEU. Similar partnerships have helped countries to better manage and secure their radiation sources. The financial requirements for these efforts have been modest. These programs should be expanded and expedited.

Countries such as Pakistan, Libya and Kazakhstan pose special challenges. In my view, Pakistan represents the greatest nuclear security challenge. It has all the technical prerequisites: HEU and plutonium; enrichment, reactor and reprocessing facilities; a complete infrastructure for nuclear technologies and nuclear weapons; largely unknown, but questionable, nuclear materials security; and missiles and other delivery systems. It views itself as threatened by a nuclear India. It has a history of political instability; the presence of fundamental Islamic terrorists in the country and in the region; uncertain loyalties of some civilian (including scientific) and military officials; and it is home to A.Q. Khan, the world's most notorious nuclear black marketeer. Helping Pakistan secure its nuclear materials during these challenging times is made difficult by the precarious position of its leadership and the anti-American sentiments of much of its populace. Yet, such cooperation is imperative.

Libya presented a very special case that required technical cooperation. Once Libya decided it was in its interest to eliminate its covert nuclear program, it was crucial to do so effectively and completely, and to learn as much as possible about nonproliferation patterns and practices from Libya's nuclear program history. NNSA technical specialists did a superb job in both cases.

Kazakhstan also presented a special challenge. It possessed nuclear materials and nuclear reactors when it achieved independence from the Soviet Union. Next to Russia, it had the most extensive and sophisticated nuclear infrastructure, including the sprawling Semipalatinsk nuclear test site. Much progress has been made thanks to NNSA cooperative programs, those of the Department of State and the Department of Defense, and the non-governmental efforts of the Nuclear Threat Initiative. Yet, several serious challenges remain, such as the final disposition of the spent fuel from its fast reactor at Aktau, remain.

I recommend that the NNSA extend its technical reach even further. By working closely with the IAEA, it can help countries effectively meet their obligations under the United Nation's Security Council Resolution 1540. Resolution 1540 requires states establish and enforce legal barriers to acquisition of weapons of mass destruction whether by terrorists or by states. It requires states to ensure that they have the infrastructure in place to address the threat posed by non-state actor involvement in any aspect of the proliferation of weapons of mass destruction. The United States was instrumental in developing this resolution and in getting it adopted. Now, it must take the next step and help provide technical assistance to countries that are struggling to meet its requirements.

Enlist the Developed Nuclear Countries to More Effectively Secure Nuclear Materials and Prevent Nuclear Proliferation.—During the Cold War, the United States and Soviet Union cooperated to prevent nuclear proliferation. After the break up of the Soviet Union, U.S. efforts focused on helping Russia deal with its risks. As indicated above, these risks have been reduced considerably through U.S.-Russian cooperation. However, Russia has not re-engaged effectively to strengthen international efforts. Although it has cooperated with the United States in repatriating some weapons-usable nuclear material from the former states of the Soviet Union or its former satellites, its leadership on the global scene is not commensurate with its nuclear status. Although it has promoted international cooperation in reactor

technology, providing nuclear fuel services, and storing nuclear waste, it has promoted global export of its own nuclear technologies without sufficient consideration of nuclear proliferation consequences. It has not contributed much to the resolution of North Korea's nuclear crisis and has been less than helpful in resolving the Iranian nuclear dilemma.

Historically, China has not played a constructive role in limiting nuclear proliferation. Its past and current relationship with Pakistan remains troublesome. However, in recent years China has shown an interest in becoming constructive. Its 2005 non-proliferation policy paper represents a step in the right direction. China is tightening its export controls and has joined the Nuclear Suppliers Group (NSG). It has begun to engage constructively with the United States to improve the security of its nuclear materials in the civilian sector. The two countries have also begun to cooperate to improve the management and security of radiation sources in China. China has chosen not to engage more fully with the United States to cover its defense nuclear sector because its grievances over the Cox Report have not been addressed. In the past few years, China has also played a constructive role in trying to resolve the North Korean nuclear crisis by hosting the Six-Party Talks, although its approach differs from that of the United States because its strategic interests in North Korea differ. The bottom line is that China can and must do more to work effectively on global nuclear proliferation challenges. Although China will be guided by its own interests, the United States will play a pivotal role in how and when China engages.

India has, not surprisingly, been missing from the global nonproliferation effort. Since India is outside the nonproliferation regime because it did not sign the NPT, it is viewed by many as a proliferator. It views itself as a legitimate nuclear weapon state with a commendable nonproliferation record. India's nuclear program has been shaped largely by the international sanctions that followed its first nuclear test in 1974. The sanctions appeared to have done little to limit India's nuclear weapon program, but they have limited its nuclear energy program and prevented cooperation in nonproliferation. Some welcome progress has been made recently in the area of nuclear reactor safety through cooperative efforts between the U.S. Nuclear Regulatory Commission and the Indian Atomic Energy Regulatory Board. There is much that should be done to work with India on its domestic safeguards and on its international nonproliferation support.

The European Union has been a constructive member of the international nonproliferation effort. Several of its members have promoted global nuclear security and combating nuclear terrorism through G-8 initiatives with the United States. The EU-3 (Germany, France and the United Kingdom) have led the frustrating nuclear negotiations with Iran over the past few years.

In recent years, the United States has carried the brunt of the international burden in preventing nuclear proliferation and combating the potential of global nuclear terrorism. It played the leading role in helping Russia cope with the nuclear dangers inherent in the breakup of the Soviet Union. We have turned our attention to focus on the global nature of the threat but, despite U.S. efforts, we appear to be losing ground. It is critical to enlist the full participation of the other major players in the nuclear arena. They should be enlisted in partnerships that span a broad spectrum of nuclear cooperation: This should include, for example, best practices in nuclear materials security, development of nuclear materials data bases, nuclear detection technologies, proliferation risk analysis, emergency response, nuclear forensics and attribution.

The IAEA's role should be strengthened. The international safeguards effort is under enormous strain. The special inspection in North Korea and Iran require significant effort. The IAEA's overall workload has increased dramatically over the past 25 years. The number of safeguarded facilities has increased more than three-fold and the amount of HEU and separated plutonium has increased six-fold. The Additional Protocol has increased the number and complexity of inspections. Yet, the overall budget of the agency has remained relatively flat. The expansion of commercial nuclear power will tax the IAEA beyond its current capacity.

STRENGTHENING THE NONPROLIFERATION REGIME AND EXPANDING NUCLEAR POWER

The nonproliferation regime is under stress. North Korea's nuclear program and Iran's determined drive to uranium enrichment demonstrate how some nations use the NPT's promotion of civilian nuclear programs clandestinely to develop nuclear weapons or develop the nuclear weapon option. This problem is compounded by the fact that Article X allows nations to withdraw from the treaty without penalty. The recent revelations about Syria's clandestine nuclear program are especially troublesome because it was generally believed that national technical means would detect

such a massive effort long before it entered such an advanced stage. The nonnuclear weapons states express an additional concern. They contend that the nuclear weapon states have not met their Article VI obligations toward nuclear disarmament. These differences contributed to the disastrous outcome of the 2005 NPT review conference. Prospects for the 2010 conference look just as grim unless progress is made on the North Korean and Iranian problems and on Article VI obligations.

All of these concerns have surfaced just when commercial nuclear power is poised to take off globally because of worldwide energy demand and concerns about global climate change. An expansion of nuclear power will bring additional challenges to secure more nuclear material in more countries and to prevent additional states from turning their nuclear energy capabilities into nuclear weapons programs. The DOE's Global Nuclear Energy Partnership is a step in the right direction, but it needs better definition domestically and must become truly global to take into account the needs of the principal partners as well as those interested in future nuclear power.

STRENGTHENING U.S. TECHNICAL CAPABILITIES TO COMBAT PROLIFERATION AND NUCLEAR TERRORISM

The proliferation of nuclear weapons and weapons capability is growing. The danger of nuclear terrorism is real. This is not a fight the United States can win alone. We cannot simply push the dangers beyond our borders. It is imperative to forge effective partnerships to combat the dangers of nuclear terrorism and the proliferation of nuclear weapons. Meeting these challenges will require diplomatic initiative and technical cooperation. The United States must lead international diplomacy and DOE/NNSA must provide technical leadership and capabilities.

Unfortunately, the technical talent and facilities at the DOE/NNSA laboratories are steadily eroding. The technology base for nonproliferation and counter-terrorism activities rested on robust research programs in nuclear weapons and nuclear energy. Nuclear energy programs in the United States are just re-emerging from a couple of decades of inactivity. Nuclear weapons research has declined and has increasingly restricted its breadth of research. Moreover, facilities that were previously available for safeguards research are more difficult and costly to access. Consequently, more of the burden has fallen on the nonproliferation and verification budget of the NNSA. It has not kept up with the increased need for technical innovation in these areas.

In addition, much of the safeguards technology developed and deployed around the world was typically demonstrated and refined domestically in U.S. nuclear facilities. These domestic safeguards technology development programs provided the foundation for measurement technologies, systems analysis and modeling in safeguards. For example, in the mid-1990's the Los Alamos National Laboratory had over \$7 million in domestic safeguards funding primarily focused on advancing the state of the art in nondestructive analysis. Today, it is approximately \$250,000. Most of the domestic funds are expended for physical protection—guns, bullets and concrete to repel external threats based on the design basis threat. Consequently, we are falling behind in applying modern technologies to safeguard our domestic facilities and our technology base for safeguards is at risk. Moreover, it has become increasingly difficult to operate domestic nuclear facilities productively. The regulatory environment combined with a risk-averse operating environment has made it difficult to get work done, consequently losing the interest of some of the talent necessary for such programs. Recruitment of new talent in safeguards and other areas important in safeguards and verification has been difficult. A recent study by the American Physical Society and the American Association for the Advancement of Science¹ pointed out the great difficulty in educating and training scientific talent in nuclear forensics and disciplines such as radiochemistry.

The DOE/NNSA leadership has recognized these problems and recently launched the Next Generation Safeguards Initiative. This initiative would strengthen domestic capabilities by launching a generational improvement in safeguards technologies. It would greatly enhance the application of modern information technologies to safeguards. Other priorities include advanced safeguards approaches and proliferation risk assessments; enhanced modeling and simulation tools to better integrate safeguards into the design of new facilities; improved automation and automated process monitoring systems with real-time data transmission; better measurement technologies; and portable and multifunctional detectors. The Initiative recognizes the need to transfer these improvements to the IAEA so that it can deploy them in the

¹Michael May, Chair, "Nuclear Forensics Role, State of the Art, and Program Needs," Joint Working Group of, AAAS, APS Physics, 2007.

field to meet the demand for greater and more sophisticated inspections. It also recognizes the need to build university-laboratory partnerships to provide educational support and training opportunities for the next generation of safeguards specialists. The Initiative also properly recognizes the need to leverage the nuclear capabilities of other nations to strengthen domestic and international safeguards capabilities. I strongly encourage the DOE/NNSA to develop this initiative and Congress to provide adequate funds.

I want to make some final comments on the importance of having our technical specialists on the ground in country. The NNSA technical teams in Russia have been crucial in assessing the risks in the Russian nuclear complex, in comparing technologies and approaches to nuclear security and to learn from Russia's practices and experience. My recent trip to India's nuclear centers underscored the importance of an in-country presence. I gained a much better appreciation for their domestic safeguards and security practices. I learned just how strongly the Indian nuclear energy program is geared to self-reliance. I learned how international sanctions over more than 30 years have slowed India's drive toward nuclear energy, but most likely not done much to slow its nuclear weapon progress. I found that whereas sanctions slowed progress in nuclear energy, they made India self-sufficient in nuclear technologies and world leaders in fast reactor technologies. While much of the world's approach to India has been to limit its access to nuclear technology, it may well be that today we limit ourselves by not having full access to India's nuclear technology developments. Such technical views should help to advise the diplomatic efforts with India.

I have been in North Korea five times in the past 4 years and visited the Yongbyon Nuclear Center three times, including this past February 14. I have had sufficient access to make a reasonable technical assessment of North Korea's nuclear capabilities. North Korea has the bomb, but not much of a nuclear arsenal. It has most likely produced and separated between 40 and 50 kilograms of plutonium, sufficient for about six to eight bombs. I believe that North Korea is seriously disabling its Yongbyon nuclear facilities and that elimination of plutonium production is within reach. I was able to witness the activities of the DOE/NNSA technical teams on the ground in Yongbyon. They have done a superb job supervising the disablement of the Yongbyon facilities and they have very ably advised and supported the diplomatic process. I provide a detailed report of my observations and conclusions in Attachment II.

Senator DORGAN. Dr. Hecker, thank you very much.

Dr. Bunn, you may proceed.

Senator DOMENICI. Dr. Bunn, would you wait a minute?

Before Mr. Tobey leaves, I wonder if I could tell him that I want to ask a question for the record. I am going to leave it.

Senator DORGAN. Yes.

Senator DOMENICI. I am you going to leave a question about the 123 agreement and what we can expect from it. So that will be here for you before you leave.

Thank you, Mr. Chairman.

Thank you very much, Dr. Bunn.

**STATEMENT OF DR. MATTHEW BUNN, BELFER CENTER FOR SCIENCE
AND INTERNATIONAL AFFAIRS, JOHN F. KENNEDY SCHOOL OF
GOVERNMENT, HARVARD UNIVERSITY**

Dr. BUNN. Thank you. It is an honor to be here today to talk about preventing nuclear terrorism and nuclear proliferation, which are critical issues for our national security.

Money is probably not the most important constraint on our ability to reduce these risks, but there are several areas where bigger budgets could mean faster progress.

NNSA's nonproliferation programs are excellent investments in our national security and they are making substantial progress, as we have already heard. But the next President will find that much more still remains to be done, and with this year's budget, Congress should really focus on making sure that the next team has

the resources and the flexibility to hit the ground running when they take office in January.

I urge Congress to complete a budget this year. Operating on continuing resolutions for months into the fiscal year can be crippling for some of these fast-changing programs that have to respond to rapidly changing opportunities.

So let me outline a few priorities.

The first priority is preventing nuclear terrorism, and our most effective tool for doing that is to secure nuclear weapons and materials at their source so they cannot be stolen and fall into terrorist hands. We urgently need a global campaign to ensure that all the caches of nuclear weapons and materials, not just the ones in Russia, are secure and accounted for to standards sufficient to defeat the kinds of threats that terrorists and criminals have shown they can pose in ways that will work and in ways that will last after our assistance phases out. There are many obstacles to achieving that objective. It is going to take sustained leadership from the highest levels of the Government.

The International Nuclear Materials Protection and Cooperation Program face costs in Russia that have shot up since their budget was put together. More expensive estimated costs to help Russian sites prepare to sustain security on their own and new opportunities in both Russia and South Asia. And I recommend an increase of about \$60 million to \$70 million in their budget.

In the case of the Global Threat Reduction Initiative, more money is needed to further accelerate the conversion of highly enriched uranium-fueled research reactors to proliferation-resistant LEU fuel, to accelerate the pace of removing nuclear material, to broaden that removal to cover a larger fraction of the world's HEU and a broader set of policy tools for convincing sites to give it up, and to secure radiological sources in research reactors around the world. All told, I think that they might need as much as an additional \$200 million or more to move forward as rapidly as they can in reducing these security risks.

We also need additional steps to establish effective global standards for nuclear security, building on Security Council Resolution 1540 that requires every state to have effective nuclear security in place.

I believe we also need a larger investment in nuclear forensics where, at least at some of our labs, they have actually had to lay off some of their people working on nuclear forensics in recent times.

Next, it is critical that the next President engage with the governments of North Korea and Iran to put together a package, an international package, of carrots and sticks big enough and credible enough to convince them to give up their nuclear weapons ambitions and allow the verification that we would require. That will be mostly a White House and State Department effort, but Congress should be prepared to provide supplemental funding as needed for NNSA to take part in the verification of packaging of nuclear material, the dismantlement of nuclear facilities, and so on.

Third, we need to reduce the demand for nuclear weapons, an effort that has been much more successful than many people realize. Here again, the White House, the State Department, and the De-

fense Department will be taking the lead, but things that NNSA does make a difference as well. When we send a signal that despite having the world's most powerful conventional forces, we are going to need a large arsenal of nuclear weapons essentially forever, that we need new nuclear weapons and we need a complex that can rapidly build more nuclear weapons, we strengthen the arguments of nuclear hawks in other countries arguing that their own countries need nuclear weapons as well.

Moreover, it is very difficult to get the votes of non-nuclear weapons states, even our closest allies, for stronger safeguards, tougher export controls, better enforcement, all of which mean more constraints on them if we are not willing to accept constraints ourselves and live up to our NPT obligation to move toward disarmament. The next President is going to have to hit the ground running to reestablish our disarmament credentials, given that the next NPT review is coming up in 2010.

I believe that we need, given the experience of the A.Q. Khan network, a dramatically improved ability worldwide to stop black market nuclear trafficking. This will involve stepped-up police and intelligence cooperation, but we also need at NNSA, I think, an expanded effort to help countries around the world put effective export controls, border controls, transshipment controls in place, as required by UNSC 1540. And I recommend an increase of about \$10 million to \$15 million for that effort.

As we look at the growth and spread of nuclear energy around the world, we need to make sure that that does not contribute to the spread of nuclear weapons. Congress took an important step last year in providing \$50 million for a fuel bank that will give countries additional assurance that they can rely on international supplies of fuel rather than building their own enrichment plants. And I am hopeful, although there are still some issues in play, that we can reach agreement to establish one or more fuel banks by the end of this year.

At the same time, we need to pursue even stronger incentives to convince states not to build their own enrichment and reprocessing plants. I think in that context, building a reprocessing plant of our own in the near term in my view would be a step in the wrong direction. I think that the Congress provided about the right amount of money for GNEP last year. I would encourage you to provide a similar budget this year and to provide the kind of direction that this subcommittee did last year for GNEP.

As we have heard already, NNSA is launching a Next Generation Safeguards Initiative designed to reinvest in both the technology and the people for strong safeguards, which we urgently need, and I would recommend an increase of \$10 million to \$15 million for that initiative as well beyond the budget request.

Now, with respect to the programs to redirect weapons expertise in the former Soviet Union and elsewhere, there has been a lot of criticism of those programs recently, much of which I believe is unjustified. I do believe that those programs, despite the improving Russian economy, do still have a value that is worth the small investment that we make in them.

Finally, we need information to support all of these policies. We need good intelligence and we need good analysis. I commend Con-

gress for supporting increases in DOE's intelligence budget in recent years, and those increases have supported important new programs like the Nuclear Materials Information Program.

But it is my understanding that at some of the laboratories, some of the critical intelligence capabilities, such as Livermore's Z Division, have been substantially cut back in the last year or so, and I would urge Congress to take action to reverse that because those capabilities are really some of the most important nuclear intelligence capabilities our Government has.

I also recommend that Congress provide roughly \$10 million so that NNSA can start taking a page from the play book of the Department of Homeland Security in establishing centers of excellence and other ways that they can draw on expertise from academia and from other non-government institutions to help them do their job better.

PREPARED STATEMENT

In my prepared statement, I also talk about the issues of reducing plutonium and HEU stockpiles which remain troublesome problems, as Senator Domenici mentioned, but in the interest of time, I will leave that to questions.

Thank you very much, Mr. Chairman, members of the committee.

[The statement follows:]

PREPARED STATEMENT OF DR. MATTHEW BUNN

Mr. Chairman and members of the committee: It is an honor to be here today to talk about critical issues for U.S. and world security—nuclear terrorism and nuclear proliferation, and what more the National Nuclear Security Administration (NNSA) can do to prevent them.

My basic message today is simple: while money is not the most important constraint on progress for most of the Nation's efforts to prevent nuclear proliferation and terrorism, there are several areas where additional funds could help reduce major dangers to our national security.

NNSA's nonproliferation programs are critical tools in our Nation's nonproliferation toolbox. There can be no doubt that America and the world face a far lower risk of nuclear terrorism today than they would have had these efforts never been begun. These programs are excellent investments in U.S. and world security, deserving strong support; Americans and the world owe a substantial debt of gratitude to the dedicated U.S., Russian, and international experts who have been carrying them out.

With this year's budget, Congress should focus on making sure a new team has the resources and flexibility to hit the ground running in reducing proliferation threats when they take office in January. I would urge Congress to complete a budget despite the pressures of an election year; operating on continuing resolutions until many months into a new fiscal year can be crippling for fast-changing programs such as these, making it very difficult to seize opportunities as they arise.

These programs are making substantial progress in reducing proliferation threats. But in many areas, there will still be much more to do when a new team takes office. While many of the programs in Russia are nearing completion, and their budgets will decline, efforts elsewhere around the world must expand to address the global threat, taking up the slack. Clear indicators of the global nature of the threat are everywhere—from the nuclear programs in North Korea and Iran, to the global attacks by al Qaeda and their repeated efforts to get the materials and expertise needed to make a bomb, to roughly 20 countries where the A.Q. Khan black-market nuclear network succeeded in operating for the more than 20 years before finally being disrupted, to the break-in at the Pelindaba site in South Africa last November, when four armed men penetrated the security fence without setting off any alarm at a site with hundreds of kilograms of weapon-grade highly-enriched uranium (HEU), and spent 45 minutes inside the facility without ever being engaged by the site's security forces.

I will not attempt to assess every element of NNSA's nonproliferation budget. Rather, I will outline several key nonproliferation priorities, and make recommendations for further steps NNSA or other parts of DOE can take to address them. Many of the needed actions to strengthen the global nonproliferation regime must be taken by the White House or the State Department; NNSA's critical role is in providing the technical expertise needed to back up nonproliferation initiatives, particularly in the management of nuclear weapons and materials.¹ Most of these programs are constrained more by limited cooperation (resulting from secrecy, complacency about the threat, concerns over national sovereignty, and bureaucratic impediments) than they are by limited budgets; sustained high-level leadership focused on overcoming the obstacles to cooperation is the most important requirement for success.² But in some cases, programs could move more quickly to seize risk reduction opportunities that already exist if their budgets were increased—and in still more cases, more money would be needed to implement a faster and broader effort if the other obstacles could be overcome.

PREVENTING NUCLEAR TERRORISM

The first priority is to prevent terrorists from incinerating the heart of a major city with a nuclear bomb—as al Qaeda have made clear they hope to do. This remains a real danger, though no one can calculate the probability of such a catastrophe.³

The step we can take that most reduces this danger is securing nuclear weapons and materials at their source—for making plutonium or HEU is beyond the plausible capability of terrorist groups, and if we can keep these materials and nuclear weapons themselves out of terrorist hands, we can keep terrorists from ever getting a nuclear bomb. NNSA's programs are in the process of completing the security upgrades in Russia planned as part of the Bratislava initiative, and those upgrades are dramatically reducing critical risks. But the problem of inadequately secured nuclear stockpiles is not just a Russian problem, it is a global problem. Hundreds of buildings in more than 30 countries contain enough of the essential ingredients of nuclear weapons to require the highest standards of security. The world urgently needs a global campaign to ensure that all the caches of nuclear weapons and the materials needed to make them worldwide are secure and accounted for, to standards sufficient to defeat the threats terrorists and criminals have shown the can pose, in ways that will work, and in ways that will last. Overcoming the many obstacles to achieving this objective will require sustained political leadership from the highest levels of our Government.

BUDGET INCREASES FOR MPC&A AND GTRI

But getting the job done as fast as it can be done will also require more money. In the case of the International Nuclear Materials Protection and Cooperation program (more commonly known as Materials Protection, Control, and Accounting, or MPC&A), construction costs in Russia have shot up since the administration prepared its budget request; helping Russian sites to prepare to sustain high levels of security is proving more expensive than expected; and new understandings have opened new opportunities for nuclear security cooperation in both Russia and South Asia. All told, I recommend an increase of \$60–\$70 million over the requested budget for the MPC&A effort.

In the case of the Global Threat Reduction Initiative (GTRI), there are now 45 HEU-fueled research reactors that could convert to low-enriched uranium (LEU) that cannot power a nuclear bomb with LEU fuels already available; GTRI has already accelerated the pace of these conversions, but with more money, these reactors could be converted faster. There will also be a need to build a fabrication plant for the higher-density LEU fuels now in development, in order to convert additional reactors, and GTRI will likely have to play a role in that—either by paying to build the plant or by guaranteeing fabrication contracts to give private firms sufficient in-

¹Most of that expertise resides at the national laboratories, not at DOE headquarters. This requires a continuing effort to build effective headquarters-laboratory partnerships, giving the labs the freedom to do what they do best, while keeping the policy-making functions with Federal officials.

²For an in-depth assessment of the programs focused on security for nuclear weapons and materials, see Matthew Bunn, *Securing the Bomb 2007* (Cambridge, Mass.: Nuclear Threat Initiative and Project on Managing the Atom, Harvard University, September 2007). The 2008 edition is forthcoming.

³See, for example, testimony of Charles Allen, Rolf Mowatt-Larsen, Matthew Bunn, and Gary Ackerman to the Senate Committee on Homeland Security and Governmental Affairs, hearing on "Nuclear Terrorism: Assessing the Threat to the Homeland," 2 April 2008.

centives to pay for building their own facilities. Additional funds could also accelerate the pace of removing nuclear material from vulnerable sites around the world (in part because here, too, prices are escalating). And more money is also needed to secure radiological sources and research reactors around the world—including here in the United States, where upgrades are needed for some 1,800 locations with sources of 1,000 curies or more, and for the Nation's 32 domestic research reactors. Moreover, GTRI is so far planning to return only a small fraction of the U.S.-origin HEU abroad; while most of the remainder is in developed countries, in many cases there is good reason to bring this material back as well, and more funds would be required to give these facilities incentives to give up their HEU. Finally, NNSA does not yet have a program focused on giving underutilized HEU-fueled reactors incentives to shut down—in many cases likely to be a quicker and easier approach than conversion. All told, I believe that an additional \$200 million or more is needed for GTRI to move forward as rapidly as possible in reducing these risks.⁴

OTHER NEEDED NUCLEAR SECURITY STEPS

Several additional steps could significantly contribute to efforts to secure nuclear stockpiles worldwide.

Building the Sense of Urgency.—The fundamental key to success in these efforts is convincing political leaders and nuclear managers around the world that nuclear theft and terrorism are real threats to their countries' security, worthy of a major investment of their attention and resources. If they are convinced of this, they will take the needed actions to prevent nuclear terrorism; if they remain complacent about the threat and how much it could affect them, they will not take those actions. Congress should consider making funds available for activities to build this sense of urgency and commitment, including joint briefings on the nuclear terrorist threat, nuclear terrorism exercises and simulations, helping states perform realistic "red team" tests of their nuclear security systems, and more.⁵ Such efforts might be implemented under the rubric of the Global Initiative to Combat Nuclear Terrorism—which has the potential to become the kind of global campaign to improve nuclear security that is urgently needed, though to date it has focused more on matters such as police training and emergency preparedness than on nuclear security upgrades.

Forging Effective Global Nuclear Security Standards.—As nuclear security is only as strong as its weakest link, the world urgently needs effective global nuclear security standards that will ensure that all nuclear weapons and weapons-usable materials are protected against the kinds of threats terrorists and criminals have shown they can pose—at a bare minimum, against two small teams of well-trained, well-armed attackers, possibly with inside help, as occurred at Pelindaba. (In some countries, protection against even more capable threats is required.) U.N. Security Council Resolution 1540 legally requires all countries to provide "appropriate effective" security and accounting for all their nuclear stockpiles. The time has come to build on that requirement by reaching a political-level agreement with other leading States on what the essential elements of appropriate effective security and accounting systems are, and then working to ensure that all States put those essential elements in place. In last year's defense authorization act, Congress called on the administration to seek to develop such effective global standards; Congress should now act to ensure that the administration is taking this step, and provide funding to support such efforts if needed. Ultimately, effective security and accounting for weapons-usable nuclear material should become part of the "price of admission" for doing business in the international nuclear market.

Achieving Sustainability.—If the upgraded security equipment the United States is helping countries put in place is all broken and unused in 5 years, U.S. security objectives will not be accomplished. NNSA is working closely with Russia to try to ensure that Russia puts in place the resources, incentives, and organizations needed to sustain high levels of security for the long haul—but there is much left to do, and similar efforts will be needed wherever nuclear security upgrades are undertaken. As most nuclear managers only invest in expensive security measures when the government tells them they have to, strong regulation is essential to achieving and maintaining stringent standards of nuclear security, and there is far more to do to get effective nuclear security and accounting regulations in place around the world.

⁴This does not include the potential cost of packaging and removing plutonium and plutonium-bearing spent fuel from North Korea, if an agreement to take those steps is reached. That substantial cost would likely have to be funded through a supplemental request.

⁵For a list of suggestions, see Bunn, *Securing the Bomb 2007*, pp. xxx.

Strengthening security culture.—As Gen. Eugene Habiger, former DOE “security czar” and former commander of U.S. strategic forces, has remarked: “good security is 20 percent equipment and 80 percent culture.” We need to increase efforts to build security cultures that will put an end to guards patrolling without ammunition or staff propping open security doors for convenience. NNSA is working this problem hard, but changing the day-to-day attitudes and practices at scores of facilities in dozens of countries with many different national cultures, where we have only very limited influence, is an extraordinarily difficult policy problem. Convincing nuclear managers and staff that the threats of nuclear theft and sabotage are real will be fundamental, and many of the steps needed to build high-level commitment to nuclear security will also help in building strong security cultures. Efforts similar to those now being undertaken in Russia need to be undertaken wherever nuclear weapons and the materials to make them exist. We also need more effort to learn from cases where facilities or organizations have succeeded in transforming their security or safety cultures—and from cases where they have failed to do so.

Consolidating Nuclear Stockpiles.—We need to do everything we can to reduce the number of buildings and bunkers worldwide where nuclear weapons and the materials needed to make them are located, achieving more security at lower cost. Our goal should be to remove all nuclear material from the world’s most vulnerable sites and ensure effective security wherever material must remain within 4 years or less. Over time, the United States should seek an end to all civil use of HEU. And we should not encourage commercial reprocessing and recycling of plutonium, as proposed in the Global Nuclear Energy Partnership (GNEP); even the proposed GNEP processes that do not separate “pure plutonium” would tend to increase, rather than decrease, nuclear theft and nuclear proliferation risks compared to not reprocessing this fuel.⁶ We should also work to reduce the total stockpiles of weapons and materials that must be guarded, including by ending production of more. NNSA’s recent success in enabling Russia to shut down one of its three remaining plutonium production reactors—and the shut-down of the remaining two, planned in the next 2 years—is a major milestone. But there is more to be done. It is time to get serious about negotiating a verifiable global treaty ending production of nuclear materials for weapons forever, to stop the production of highly enriched uranium for any purpose, and to stop piling up ever larger stockpiles of separated civilian plutonium. In particular, Congress should direct NNSA to return to the negotiation of a 20-year moratorium on separating plutonium in the United States and Russia that was nearly completed at the end of the Clinton administration. The troubled plutonium disposition effort and opportunities for expanded disposition of HEU are important topics treated in more detail at the end of this statement. Over the longer term, if properly managed, serious pursuit of the steps toward a nuclear weapon free world advocated by Secretaries Shultz, Kissinger, and Perry and Senator Nunn could make a significant long-term contribution to reducing nuclear terrorism risks.⁷

Strengthening International Approaches.—The International Atomic Energy Agency (IAEA) has a key role to play in improving nuclear security—helping to develop standards and recommendations, providing international peer reviews of nuclear security arrangements, coordinating efforts among different donors contributing to nuclear security improvements, and more. Some countries trust the IAEA in a way that they will never trust the United States, and the Agency is uniquely positioned to develop international security recommendations that will be broadly accepted around the world. But the IAEA’s Office of Nuclear Security is constantly hampered by its very limited budget, which is tightly constrained by earmarks for donors’ favored projects. While U.S. contributions to the IAEA largely flow through the State Department, NNSA has made substantial contributions to the Office of Nuclear Se-

⁶ See discussion in Matthew Bunn, “Risks of GNEP’s Focus on Near-Term Reprocessing,” testimony before the Committee on Energy and National Resources, U.S. Senate, 14 November 2007, available as of 28 March 2008 at <http://belfercenter.ksg.harvard.edu/files/bunn-GNEP-testimony-07.pdf>. The radioactivity of the plutonium-bearing materials that would be recovered in proposed GNEP processes is not remotely enough to deter theft by determined terrorists. See Jungmin Kang and Frank Von Hippel, “Limited Proliferation-Resistance Benefits from Recycling Unseparated Transuramics and Lanthanides from Light-Water Reactor Spent Fuel,” *Science and Global Security* 13, no. 3 (2005).

⁷ See George P. Shultz, William J. Perry, Henry A. Kissinger, and Sam Nunn, “Toward a Nuclear-Free World,” *Wall Street Journal*, 15 January 2008, and Matthew Bunn, “Securing Nuclear Stockpiles Worldwide,” in *Reykjavik Revisited: Steps Toward a World Free of Nuclear Weapons* (Palo Alto: Hoover Institution, forthcoming). For recent discussions of steps to reduce existing stockpiles of HEU and separated plutonium, see Matthew Bunn and Anatoli Diakov, “Disposition of Excess Highly Enriched Uranium,” and “Disposition of Excess Plutonium,” in *Global Fissile Materials Report 2007* (Princeton, NJ: International Panel on Fissile Materials, October 2007, available as of 28 March 2008 at <http://www.fissilematerials.org>), pp. 24–32 and 33–42.

curity in the past. I recommend that Congress direct an additional \$5–\$10 million contribution to the IAEA’s Office of Nuclear Security, to strengthen its efforts to contribute to nuclear security worldwide.

Sharing Nuclear Security Best Practices.—Just as the nuclear industry created the World Association of Nuclear Operators (WANO) after the Chernobyl accident, to bring the worst performers on safety up to the level of the best performers, the world needs a World Institute of Nuclear Security (WINS), to provide a focus for exchanging best practices in nuclear security and material control and accounting. The Nuclear Threat Initiative (NTI) and the Institute for Nuclear Materials Management are working with the nuclear community to establish such an institution. To be effective, this should ultimately be led by those with direct responsibility for managing nuclear material and facilities. But it may be necessary for NNSA and others to provide initial seed money to get it going; Congress should consider appropriating a few million dollars for that purpose.

Building Genuine Partnerships.—To be successful, all of these efforts must be pursued in a spirit of genuine partnership, serving both our interests and those of the partner states, with ideas from each side’s experts incorporated into the approach; the experts in each country know their materials, their facilities, their regulations and bureaucracies, and their culture better than we do, and we need to listen to them to get the “buy-in” essential to long-term sustainability. In particular, while these programs must look beyond Russia to the world, there is a special need for partnership with Russia, as Russia and the United States bear a special responsibility, with some 95 percent of the world’s nuclear weapons and more than 80 percent of its stocks of weapons-usable nuclear material. The shift to a true partnership approach should include establishing joint teams that would help other states around the world upgrade security. The Global Initiative to Combat Nuclear Terrorism, co-led by the United States and Russia, is an important step in the right direction. But as the President and Congress consider actions which strongly affect Russian interests, from missile defense in Europe to the expansion of NATO to Russia’s borders, they need to consider the potential impact on the prospects for effective nuclear security partnership as well.

BEYOND NUCLEAR SECURITY

While securing nuclear weapons and materials at their source is the most effective tool to reduce the risk, we cannot expect it to be perfect. We urgently need a substantially stepped-up effort to build police and intelligence cooperation focused on stopping nuclear smuggling and the other elements of nuclear plots in countries all over the world, including additional sting operations and well-publicized incentives for informers to report on such plots. This will make it even more difficult for potential nuclear thieves and those who would like to buy stolen material to connect, and to put together the people, equipment, expertise, and financing for a nuclear bomb conspiracy without detection.

The United States should also work with key states around the world to ensure that they put in place laws making any participation in real or attempted theft or smuggling of nuclear weapons or weapons-usable materials, or nuclear terrorism, crimes with penalties comparable to those for murder or treason.

The Real, But Limited, Role of Radiation Detection.—Radiation detection at ports, border crossings, and elsewhere will play a role in these later lines of defense, but its contribution to reducing the risk of nuclear terrorism will inevitably be limited. The length of national borders, the diversity of means of transport, the vast scale of legitimate traffic across these borders, the small size of the materials needed for a nuclear bomb, and the ease of shielding the radiation from plutonium or especially from HEU all operate in favor of the terrorists. Neither the detectors now being put in place nor the Advanced Spectroscopic Portals planned for the future would have much chance of detecting and identifying HEU metal with modest shielding—though they likely would be effective in detecting plutonium or strong gamma emitters such as Cs-137 that might be used in a so-called “dirty bomb.”⁸ Most of the past successes in seizing stolen nuclear material have come from conspirators informing on each other and from good police and intelligence work, not from radiation detectors.

Hence, while it is worth making some investment in radiation detection, we should not place undue reliance on this line of defense. That being said, NNSA’s Second Line of Defense program has been successful in cooperating with many coun-

⁸ See, for example, Thomas B. Cochran and Matthew G. McKinzie, “Detecting Nuclear Smuggling,” *Scientific American*, March 2008, available as of 28 April 2008 at <http://www.sciam.com/article.cfm?id=detecting-nuclear-smuggling>.

tries to put radiation detection in place at key ports and border crossings, and to take advantage of all the opportunities for cooperation with key countries that it now has before it would require \$50–\$60 million beyond the budget request.

A Modified Approach to Cargo Scanning.—Beyond the budget, Congress should act to modify the approach to radiation scanning of cargo containers approved last year. By requiring 100 percent of containers coming into the United States to be scanned (an extraordinarily difficult target to meet), offering the possibility of a waiver, and setting no requirements for the quality of the scanning or for what should be done with the information from the scans, Congress may have inadvertently created a situation where the requirement will repeatedly be waived and the scanning put in place will be of low quality and lead to little action. Congress should approve a revised approach in which terrorists would know that each container had a high chance of being scanned; the scans were done with the best available scanning technology; and the scans would be linked to immediate further search and other action in the event of unexplained detections. This would do more to keep terrorists from using containers to smuggle nuclear weapons and materials. At the same time, Congress should insist that the Department of Homeland Security provide a detailed assessment of the vulnerability posed by the countless potential pathways for nuclear smuggling between official points of entry, and should mandate an independent assessment of the cost-effectiveness of large investments in radiation detection at official points of entry when intelligent adversaries have options for going around them.⁹

A strengthened nuclear forensics effort. Congress should also act to strengthen U.S. and international efforts in nuclear forensics (the science of examining characteristics of seized nuclear material or nuclear material collected after a nuclear blast for clues to where it came from). I recommend that Congress increase funding for nuclear forensics R&D by at least \$10 million and direct that a robust portion of available funding be spent to maintain and expand the technical capabilities at the U.S. laboratories (currently so much of the funding is staying at the Department of Homeland Security that U.S. laboratories working on forensics of seized materials have had to lay off some of their staff). In addition, I recommend that Congress direct the administration to pursue expanded efforts to put together an international database of material characteristics. Congress should understand, however, that nuclear material has no DNA that can provide an absolute match: nuclear forensics will provide a useful but limited source of information to combine with other police and intelligence information, but will rarely allow us to know where material came from by itself.¹⁰

COPING WITH NORTH KOREA AND IRAN

The next priority is to cope with the nuclear programs of North Korea and Iran. If both North Korea and Iran become established nuclear weapon States, this will be a dramatic blow to the entire global effort to stem the spread of nuclear weapons, and will put significant pressure on some of their neighbors to follow suit. The Bush administration's no-engagement approach to Iran has clearly failed, allowing Iran to move forward unimpeded with a substantial enrichment capability, just as the administration's earlier "threaten and watch" approach to North Korea failed utterly, leaving North Korea with a tested nuclear bomb and enough plutonium to make 5–12 nuclear weapons. The next president needs to take a new tack, putting together international packages of incentives and disincentives large enough and credible enough to convince the North Korean and Iranian governments that it is in their national interests to agree to arrangements that would put a wide and verifiable gap between them and a nuclear weapons capability. If we want these governments to address our concerns, the U.S. Government will have to address some of their key concerns—which may in the end require difficult choices, such as providing Iran with a security assurance as part of such an agreement, and acknowledging that at this point, a ban on all enrichment in Iran, however desirable, can no longer be achieved.¹¹ It is primarily the White House and the State Depart-

⁹For a more optimistic view on this part of the problem, see Levi, *On Nuclear Terrorism*, pp. 87–96.

¹⁰See Nuclear Forensics Working Group (Michael May, chair), *Nuclear Forensics: Role, State of the Art, Program Needs* (Washington, DC: American Physical Society and American Association for the Advancement of Science, February 2008).

¹¹For a discussion of the risks to U.S. national security of continuing to insist on zero enrichment in Iran, see Matthew Bunn, "Constraining Iran's Nuclear Program: Assessing Options and Risks," presentation at Oak Ridge National Laboratory, 15 November 2007, available as of 28 April 2008 at http://belfercenter.ksg.harvard.edu/files/Matthew_Bunn_Oak_Ridge.pdf. For an

ment that need to take action, but Congress should be prepared to provide supplemental funding as needed for NNSA support to verification, packaging and removing nuclear materials and equipment, and helping to decommission nuclear facilities and redirect nuclear experts.

REDUCING DEMAND FOR NUCLEAR WEAPONS

The third priority is to reduce the demand for nuclear weapons around the world. Efforts to reduce demand have been more successful than is usually recognized. Today, there are more countries that started nuclear weapons programs and then decided to give them up and accept international inspections than there are states with nuclear weapons—meaning that even once states start nuclear weapons programs, efforts to convince them that nuclear weapons are not in their interest succeed more often than they fail.

Here, too, many of the needed steps require White House, State Department, or Defense Department action. But NNSA's programs can have an important effect on the demand for nuclear weapons as well. When the country with the most powerful conventional forces on earth insists that large numbers of nuclear weapons are essential to its security, that they will remain essential forever, that new nuclear weapons are needed, and that a transformed complex that is "responsive" in the sense that it could rebuild a larger nuclear arsenal if need be is also essential, this strengthens the arguments of those in other countries arguing that their country also needs nuclear weapons. Perhaps even more important, it will be far more difficult to get political support from non-nuclear-weapon states for stronger safeguards, more stringent export controls, tougher enforcement, and the other measures urgently needed to strengthen the global nonproliferation regime—all of which involve more constraints and costs for them—if the United States and the other NPT weapon states are seen as failing to live up their legal obligation, under Article VI of the Nonproliferation Treaty (NPT), to move in good faith toward nuclear disarmament.

I believe that the case has not been made that the claimed benefits of the Reliable Replacement Warhead (RRW) outweigh these and other potential downsides. I recommend that the Congress continue to refuse to fund that program, and direct NNSA to focus on a smaller, cheaper complex designed only to support a much smaller nuclear stockpile for the future. The next president should recommit the United States to the Comprehensive Test Ban Treaty, and work to build the support in the Senate that will be necessary for ratification.

More broadly, the United States and Russia, as the states with the world's largest nuclear stockpiles, should agree to reduce their total stockpiles of nuclear weapons to a small fraction of those they hold today, and to declare all their HEU and plutonium beyond the small stockpiles needed to support the remaining agreed nuclear weapon stockpiles (and modest set-asides for naval fuel) as excess to their military needs. Both countries should put this excess material in secure storage sites subject to international monitoring, and reduce these stocks through use or disposal as quickly as that can safely, securely, and cost-effectively be done.¹²

Toward these ends, I recommend that Congress provide funding and direction for NNSA to:

- Further increase the rate of dismantlement of nuclear weapons and HEU components;
- Establish international monitoring of HEU and plutonium declared excess to date; and

imaginative proposal for a multilaterally owned and staffed enrichment facility in Iran, designed so that it can be easily and permanently disabled if Iran ever takes action to turn it to weapons use, see Geoffrey Forden and John Thompson, *Iran as a Pioneer Case for Multilateral Nuclear Arrangements* (Cambridge Mass.: Science, Technology, and Global Security Working Group, Massachusetts Institute of Technology, 2006 (revised 2007)), available as of 28 April 2008 at <http://mit.edu/stgs/irancrisis.html>. For a discussion of the current issues, and of a proposal similar to the Forden-Thompson proposal, see William Luers, Thomas R. Pickering, and Jim Walsh, "A Solution for the U.S.-Iran Nuclear Standoff," *New York Review of Books*, 20 March 2008, available as of 28 April 2008 at <http://www.nybooks.com/articles/21112>.

¹²In the Trilateral Initiative, the United States, Russia, and the IAEA developed technologies, procedures, and legal agreements that would make it possible for excess material to be placed under international monitoring irrevocably, without revealing classified information. I will address the issue of disposition of excess material in more detail at the end of this testimony. For visionary discussions of the need for both near-term steps to reduce nuclear danger and a broad vision of a world without nuclear weapons, see George P. Shultz, William J. Perry, Henry A. Kissinger, and Sam Nunn, "A World Free of Nuclear Weapons," *Wall Street Journal*, 4 January 2007, and "Toward a Nuclear-Free World," *Wall Street Journal*, 15 January 2008.

—Participate in the British initiative to develop approaches to international verification of nuclear disarmament.

These steps are particularly important in the lead-up to the NPT Review Conference in 2010. In 2005, at a moment when the world needed to build consensus on steps to strengthen the global effort to stem the spread of nuclear weapons, the NPT Review Conference collapsed in disarray, in substantial part because the Bush administration refused to even discuss the steps toward disarmament the United States and all the other NPT parties had committed to at the previous review. We cannot afford a similar failure at the upcoming review in 2010. The next president will have to move quickly to re-establish U.S. credibility on nuclear disarmament.

I fear that the recent U.S.-India nuclear cooperation agreement, modifying long-standing nonproliferation rules, may also add to the arguments of nuclear weapons advocates in other countries. Already, Iranian colleagues tell me that nuclear hawks in Tehran have pointed to this accord, arguing that while much of the international community sanctioned India after the 1998 tests, the United States was soon back, looking for a strengthened relationship and expanded trade, and has now said, in effect, “all is forgiven”—and that in much the same way, sanctions on oil-rich Iran would never last long, however far it might push its nuclear program. Congress should carefully consider whether the benefits of this agreement are worth these risks.

STOPPING BLACK-MARKET NUCLEAR NETWORKS

The experience of the global black-market nuclear network led by Pakistan’s A.Q. Khan—which operated in some 20 countries for over 20 years before it was finally disrupted, at least in part—makes clear that urgent steps are needed to strengthen the world’s ability to detect and stop such black-market networks, and to strengthen global export controls. Unfortunately, it is clear that black-market nuclear networks continue to operate, and to pose serious dangers to the global future.

As with stopping smuggling of nuclear materials, stopping nuclear technology networks will require stepped-up international police and intelligence cooperation; the police and intelligence response must be just as global as these networks are.

It will also require a radical improvement in global controls over exports and transshipments of sensitive technologies. In addition to requiring “appropriate effective” nuclear security and accounting, UNSC 1540 requires every U.N. member state to put in place “appropriate effective” export controls, border controls, and trans-shipment controls. We should be making greater use of this new nonproliferation tool, helping to define what essential elements must be in place for states’ controls in these areas to be considered appropriate and effective, and helping states put those essential elements in place. Today, important export control assistance programs are in place which are making a real difference—but they remain limited to a handful of key countries, despite the Khan network’s demonstration that countries that no one thought of as having sensitive technology may provide key nodes for a black-market network. I recommend that Congress increase the budget for NNSA’s export control assistance program by at least \$10–\$15 million, and direct the administration to develop a plan for making sure all countries fulfill their UNSC 1540 obligation to put effective controls in place.

REDUCING THE PROLIFERATION RISKS OF NUCLEAR ENERGY

Today, demand for nuclear energy is growing, in response to concerns over fossil fuel prices and availability and over climate change. It is crucial to take steps today to ensure that the spread of nuclear energy does not contribute to the spread of nuclear weapons.¹³

The most critical technologies of concern are enrichment and reprocessing, either of which can be used to support a civilian nuclear fuel cycle or to produce material for nuclear weapons. Every State that establishes an enrichment plant or a reprocessing plant is in a position, should it ever choose to do so, to withdraw from the NPT and quickly produce nuclear material for nuclear weapons. Restraining the spread of these technologies is a critical nonproliferation goal.

There is no prospect, however, for an effective agreement that would ban additional states from developing enrichment and reprocessing technology; states simply will not agree to forswear this possibility indefinitely. The United States should eliminate “forswear” “forgo” and similar “f words” from our vocabulary in discussing

¹³ For a discussion, see Matthew Bunn, “Proliferation-Resistance (and Terror-Resistance) of Nuclear Energy Systems,” presentation to “Systems Analysis of the Nuclear Fuel Cycle,” Massachusetts Institute of Technology, 20 November 2007, available as of 28 April 2008 at http://belfercenter.ksg.harvard.edu/files/bunn_proliferation_resistance_lecture.pdf.

these topics. The best that can be done is to convince suppliers to limit exports of these technologies to additional countries—which they have been doing since the mid-1970s—and, just as important, to give states strong incentives to rely on international suppliers for these services rather than making the large investments required to build enrichment and reprocessing plants of their own.

Congress took an important step in this direction last year in providing \$50 million for an international fuel bank, which would increase states' confidence that international supply would not be disrupted. The IAEA is still struggling to reach agreement on the terms and conditions for this bank, and to recruit additional donors. If all goes well, however, agreement on one or more fuel banks could be reached this calendar year.

A fuel bank will be a useful step—but as the commercial market already provides strong assurance of fuel supply for most states, a fuel bank alone will only create a modest additional incentive to rely on international supply. The United States, Russia, and other nuclear suppliers are now working together to put together other incentives—including help with infrastructure for nuclear energy, financing, and the like. “Fuel-leasing”—fresh fuel supply combined with a promise to take the spent fuel away—could be a particularly powerful incentive for states to rely on international supply, since it could potentially allow more states to use nuclear energy without having to establish their own geologic repositories. I do not believe that take-back of spent fuel from foreign countries will be politically tenable in the United States in the near term, whether the reprocessing and transmutation technologies proposed for the Global Nuclear Energy Partnership (GNEP) are under active development or not; but Russia has legislation in place that allows it to enter into such contracts, and others may decide to enter the market for taking back spent fuel in the future.¹⁴

One step the United States should not take is to build a reprocessing plant ourselves in the near-term.¹⁵ Sending the message that the United States, with the world's largest reactor fleet, considers reprocessing essential to the future of nuclear energy will make it more difficult to convince other countries not to pursue their own reprocessing facilities. This, like RRW and the weapons complex, is an area where there would be nonproliferation benefits from spending less than the administration's request. I recommend that Congress provide a fiscal 2009 budget for GNEP similar to the fiscal 2008 budget provided in the omnibus appropriation, with program direction similar to that this subcommittee provided in its bill last year. Within that overall budget, spending on development of small sealed-core reactors with high degrees of inherent safety and security should be increased, to roughly \$10 million. Such reactors—sometimes known as “nuclear batteries”—might be factory-built, transported to where they would be used with a lifetime core of fuel already inside, and then transported back intact after 10–20 years of electricity generation, with little access to plutonium-bearing fuel and little build-up of weapons-relevant nuclear expertise, potentially making nuclear energy widely available with reduced proliferation risks.

STRENGTHENING SAFEGUARDS

Events in Iran, Libya, and elsewhere make clear that the world needs a stronger nuclear safeguards system. The U.S. Government needs to do more to ensure that the International Atomic Energy Agency has the resources, authority, personnel, and technology it needs to do its job. In particular, the United States is behind on its assessed dues to the IAEA, and Congress should provide funding to pay the back dues and direct that the United States pay its dues on time each year. Congress should also provide increased funding for the United States voluntary contribution to the IAEA, in particular to ensure that funding is available for needed upgrades to the Safeguards Analytical Laboratory.

That funding largely flows through the State Department. NNSA's role has traditionally been focused more on technical support for safeguards. But the U.S. investment in safeguards technology and safeguards experts at the national laboratories

¹⁴ Countries can already contract to send their spent fuel to France, the United Kingdom, or Russia for reprocessing, but France and the United Kingdom require that the high-level waste be returned, so countries still need a geologic repository.

¹⁵ For a more extended discussion, see Matthew Bunn, “Risks of GNEP's Focus on Near-Term Reprocessing,” testimony before the Committee on Energy and National Resources, U.S. Senate, 14 November 2007, available as of 28 April 2008 at <http://belfercenter.ksg.harvard.edu/files/bunn-GNEP-testimony-07.pdf>. See also Edwin Lyman and Frank N. von Hippel, “Reprocessing Revisited: The International Dimensions of the Global Nuclear Energy Partnership,” *Arms Control Today*, April 2008, available as of 28 April 2008 at http://www.armscontrol.org/act/2008_04/LymanVonHippel.asp.

has declined dramatically since the early 1990s. Neither the IAEA nor the U.S. programs to support it have the resources needed to adapt the most modern technologies being developed in the commercial sector to the needs of safeguards, or to pursue longer-term safeguards R&D. NNSA has undertaken a very thoughtful “Fundamental Safeguards Review,” and as a result of that has launched a “Next Generation Safeguards Initiative.” Within nuclear energy R&D, more focus is also needed on “safeguards by design”—building effective safeguards and security in from the outset in design and construction of new facilities, just as is done with safety today. I recommend an increase of \$10–\$15 million in the funding for this critical effort, to finance both expanded R&D and expanded efforts to recruit, train, deploy, and retain the next generation of safeguards experts.¹⁶

LIMITING PROLIFERATION OF NUCLEAR, CHEMICAL, AND BIOLOGICAL EXPERTISE

Despite the recent improvements in the Russian economy, I believe that NNSA’s scientist-redirection programs continue to offer benefits to U.S. security worth the modest investments the U.S. Government makes in them. Contrary to recent newspaper reports,¹⁷ the fact that some institutes that have received NNSA funds also have some experts who have worked on a safeguarded power reactor in Iran does not in any way mean that NNSA programs have somehow contributed to Iran’s nuclear program. Moreover, while a substantial fraction of the long-term jobs these programs have created have gone to people who are not weapons scientists,¹⁸ that is hardly a surprise. It is hard to think of a new business in the United States or elsewhere that has former weapons scientists for 100 percent, or even 80 percent, of its employees.

At the same time, there is clearly a need to reform these efforts to match today’s threats. The dramatically changed Russian economy creates a very different threat environment. The experience of the A.Q. Khan network suggests that dramatic leakage of proliferation-sensitive expertise may come from well-to-do experts motivated by ideology and greed, and not only from desperate, underemployed experts. For a terrorist group, a physicist skilled in modeling the most advanced weapons designs—the kind of person who has often been the focus of these programs in the past—may be much less interesting than a machinist experienced in making bomb parts from HEU metal, or a guard in a position to let thieves into a building undetected. Experts who are no longer employed by weapons institutes, but whose pensions may be inadequate or whose private ventures may have failed, could pose particularly high risks, but they are not addressed by current programs focused on redirecting weapons expertise. We need to find ways to address all of the highest-priority risks—but we are not likely to have either the access or the resources to do everything ourselves. The solution is likely to require working in partnership with Russia and other countries, to get them to do most of what needs to be done. I recommend that Congress provide roughly \$30 million (comparable to the fiscal 2008 appropriation) for the Global Initiatives for Proliferation Prevention program, with direction to provide an in-depth analysis of what the most urgent risks of proliferation of weapons expertise are, and how they might best be addressed.

INTELLIGENCE AND ANALYSIS TO SUPPORT POLICY

Good information and analysis is critical to implementing successful nonproliferation policies. I recommend increases in two areas.

First, the increased budgets for DOE intelligence that Congress has supported in recent years have supported a number of important new initiatives, such as the Nuclear Material Information Program (NMIP), intended to compile key information on nuclear stockpiles, their security, and the threats to them around the world. But this may have left too little remaining to support the critical capabilities at the national laboratories. It is my understanding that there have been drastic cuts in the budget for Livermore’s Z Division, for example—which for decades has provided some of the highest-quality nuclear intelligence analyses available to the U.S. Government (including having been correct about Iraq’s aluminum tubes). I recommend

¹⁶For a similar recommendation for reinvestment in safeguards, see American Physical Society Panel on Public Affairs, Nuclear Energy Study Group, Nuclear Power and Proliferation Resistance: Securing Benefits, Limiting Risks (Washington, DC: APS, May 2005, available as of 28 April 2008 at <http://www.aps.org/policy/reports/popa-reports/proliferation-resistance/upload/proliferation.pdf>).

¹⁷Matthew Wald, “U.S.-Backed Russian Institutes Help Iran Build Reactor,” New York Times, 7 February 2008.

¹⁸See U.S. Government Accountability Office, Nuclear Nonproliferation: DOE’s Program to Assist Weapons Scientists in Russia and Other Countries Needs to be Reassessed (Washington, DC: December 2007).

that Congress act to ensure that these critical capabilities are maintained and expanded, while also ensuring that efforts like NMIP have the funding they need.

Second, many important ideas for preventing proliferation come from independent analysts outside the Government. Yet U.S. nonproliferation programs rely much less on work by universities and non-government organizations than many other parts of the U.S. Government do. The U.S. Department of Homeland Security, for example, despite being a relatively new department operating in areas that are often shrouded in secrecy, has established several “centers of excellence” for university-based analysis of particular categories of homeland security problems, along with other programs focused on bringing in academic expertise to contribute to improving homeland security. NNSA should do more to do the same. I believe that each of the largest and most important nonproliferation programs would benefit from having a standing advisory group of outside experts regularly reviewing its efforts and suggesting ideas for improvement. In addition, I believe that NNSA could benefit greatly from a small investment in non-government analyses of key proliferation risks and how they might be reduced more effectively. I recommend that Congress provide \$10 million specifically directed for NNSA to support such non-government analyses of effective approaches reducing proliferation risks—and to additional training of the next generation of nonproliferation experts. Depending on the degree of success of this effort, appropriate levels of funding might increase in later years.

REDUCING PLUTONIUM AND HEU STOCKPILES

Finally, disposition of the large excess stockpiles of plutonium and highly enriched uranium (HEU) in the United States and Russia continues to pose an important but difficult policy problem.¹⁹ As suggested above, the United States and Russia should agree to reduce their nuclear weapon stockpiles to very low levels and to eliminate all stocks of separated plutonium and HEU beyond those needed to support those low, agreed warhead stockpiles. This would mean disposition of far larger stocks of material in both Russia and the United States than have been declared excess so far. Since this will take many years, in the near term the United States and Russia should move to legally commit their excess material to peaceful use or disposal and place it under international monitoring to confirm that commitment—sending an important signal to the world that the United States and Russia are serious about their arms reduction obligations, at relatively minor cost.

Disposition of Excess Plutonium

Last year, Congress rescinded the remaining unobligated balances for U.S. and Russian plutonium disposition, and moved the U.S. plutonium disposition program to the Office of Nuclear Energy. This year, the requested funds are in Other Defense Activities.

The cost of the U.S. MOX program has skyrocketed over the years. DOE’s latest published estimates indicate a life-cycle cost for the MOX facility of some \$7.2 billion (not counting the substantial cost of the pit disassembly and conversion facility). DOE has never adequately explained why this facility is costing many times what comparable facilities in Europe with more capability cost to build. Even once the expected \$2 billion in expected revenue from MOX sales is subtracted, this still comes to over \$120 million per ton of excess plutonium.²⁰

Something has to be done with this plutonium, but it would be surprising if no effective approach could be found that would manage this material securely for less than \$120 million per ton. If judged solely as a nuclear energy initiative, building such a plant would certainly not be worthwhile; it would demonstrate nothing except the ability to replicate in the United States an expensive fuel cycle approach with significant proliferation risks that is already routinely done in Europe, and even if a demonstration fast reactor were built for GNEP in the near term (which I believe would be unwise), the initial core could be fabricated elsewhere at lower cost.

I recommend that Congress approve funding to proceed with the MOX plant for this year, while simultaneously directing DOE to carry out an in-depth study of potentially lower-cost alternatives. In particular, Congress should provide funding for

¹⁹For more detailed discussions, see Bunn and Diakov, “Disposition of Excess Highly Enriched Uranium,” and “Disposition of Excess Plutonium.”

²⁰Total project cost for construction is \$4.8 billion. Operations and maintenance is estimated at \$2.4 billion. See U.S. Department of Energy, fiscal year 2009 Congressional Budget Request: Other Defense Activities (Washington, DC: DOE, February 2008), pp. The per-ton calculation assumes, over-generously, that the 9 tons of excess plutonium announced in 2007 is entirely additional to the 34 tons covered under the 2000 disposition agreement and costs nothing to process.

DOE to restart development of plutonium immobilization technology, and direct DOE to outline the lowest-cost practicable immobilization option for the entire excess plutonium stockpile; Congress should also direct DOE to include, in its options assessment, the option of transporting the excess plutonium to Europe for fabrication and irradiation in existing facilities there. If, for example, the French were willing to take the United States excess plutonium for \$1 billion, the U.S. Government would have saved billions compared to other approaches; if not, that would certainly make clear that even with high uranium prices, plutonium is a costly liability, not an asset.²¹

On the Russian side, critics have raised legitimate concerns about using excess plutonium in the BN-800 fast-neutron reactor, since it creates roughly as much plutonium as it burns. While DOE is working with Russia to modify the reactor from a plutonium “breeder” to a plutonium “burner,” consuming more plutonium than it produces, this is largely a distinction without a difference, as the baseline design for the BN-800 produces only slightly more plutonium than it consumes, and the revised design produces only slightly less. More important is the fact that under the 2000 Plutonium Management and Disposition Agreement, spent fuel from plutonium disposition will not be reprocessed until decades from now, when disposition of all the plutonium covered by the agreement has been completed. Thus, a large stockpile of weapons-grade separated plutonium will be transformed into a stockpile of plutonium embedded in radioactive spent fuel—at least for some time to come.

The United States and Russia should agree that (a) the highest practicable standards of security and accounting will be maintained throughout the disposition process; and (b) all separated plutonium beyond the amount needed to support low, agreed numbers of warheads will be subject to disposition. If the United States and Russia agreed on those points, and also agreed that spent fuel from plutonium disposition (a) would not be reprocessed except when the plutonium was immediately going to be reused as fuel, and then under heavy guard, with stringent accounting measures, and (b) would only be reprocessed in ways that did not separate weapons-grade plutonium from fission products, and in which plutonium would never be separated into a form that could be used in a bomb without extensive chemical processing behind heavy shielding, then this disposition approach would deserve U.S. financial support. This is particularly the case as the BN-800 approach fits in to Russia’s own plans for the nuclear energy future, unlike previous plans that focused on MOX in VVER-1000 reactors. If the United States does not provide promised financial support for disposition in Russia, Russia may conclude that it is free to use the BN-800 to breed more plutonium from this weapons plutonium, and to reprocess the spent fuel immediately, adding to Russia’s huge stockpiles of separated plutonium. Congress should provide sufficient funding for DOE to explore such approaches, and support them if agreement can be reached.

Disposition of Excess HEU

The current 500-ton HEU Purchase Agreement expires in 2013. Russia is likely to have hundreds of tons of additional HEU at that time that are not needed either to support its nuclear weapons stockpile or for naval and icebreaker fuel. Russia has made clear that it has no interest in extending the current implementing arrangements for the HEU Purchase Agreement, under which Russia faces higher costs and lower prices than it would marketing new-production commercial LEU. But a variety of other arrangements are possible that could create substantial incentives for Russia to blend down additional HEU. Congress should direct DOE to enter into discussions with Russia concerning a broad range of possible incentives the United States might be willing to provide to help convince Russia to blend down additional HEU—and should consider setting aside a conditional appropriation in the range of \$200 million to finance such incentives if an agreement is reached that requires such funding.

Similarly, the United States can and should expand and accelerate the blend-down of its own excess HEU, beyond the roughly 3 tons per year now planned. Congress should provide additional funding targeted to accelerating the effort to get the HEU out of the canned sub-assemblies and blended down to LEU.

CONCLUSIONS

Mr. Chairman, from al Qaeda to North Korea to Iran to global black-market nuclear networks, the world today faces serious dangers from nuclear terrorism and nuclear proliferation. But there is no reason for despair. Indeed, the global effort

²¹ Areva officials indicate that there are now trades among utilities in which some utilities agree to burn MOX fabricated from other utilities’ plutonium, suggesting that if the price were right, it might be possible to convince utilities to burn this MOX in Europe.

to stem the spread of nuclear weapons has been far more successful than many people realize. Today, there are nine states with nuclear weapons; 20 years ago, there were nine states with nuclear weapons. (South Africa dropped off the list, became the first case of real nuclear disarmament, while North Korea joined the list.) That there has been no net increase during a period that saw the chaos following the collapse of the Soviet Union; secret nuclear weapons programs in Iraq, Iran, Libya, and, apparently, Syria; the entire period of the A.Q. Khan network's export operations; and the nuclear efforts of al Qaeda and Aum Shinrikyo is an amazing public policy success.

But if we hope to maintain that success into the future, there is a great deal to be done—and substantial parts of the work will need to be done by NNSA. For the coming year, I recommend additional funding and direction to:

- Move toward securing and consolidating all stocks of nuclear weapons and materials worldwide, to standards sufficient to defeat the threats terrorists and criminals have shown they can pose, in ways that will work, and in ways that will last.
- Build effective global standards for nuclear security, in part by building on the foundation provided by UNSC 1540's legal requirement that all countries provide "appropriate effective" security for whatever stockpiles they may have.
- Expand global police and intelligence cooperation focused on stopping nuclear smuggling and terrorist nuclear plots, while modifying our approach to radiation detection and cargo scanning.
- Expand R&D on nuclear forensics.
- Engage with North Korea and Iran to verifiably end their nuclear weapons programs.
- Eliminate funding for RRW; scale back funding for complex transformation to focus on a smaller, cheaper complex to support a smaller stockpile; and increase funding for dismantlement, placing excess materials under international monitoring, and developing international approaches to verifying nuclear disarmament.
- Expand global police and intelligence cooperation to stop black-market nuclear networks, and increase efforts to help countries around the world implement the UNSC 1540 obligations to put in place appropriate effective export controls, border controls, and transshipment controls.
- Provide incentives for states not to build their own enrichment and reprocessing facilities, while reducing the emphasis on near-term reprocessing in GNEP, reducing GNEP's requested budget, and increasing funding for development of small sealed-core reactors with low proliferation risks.
- Reinvest in the people and technology needed for advanced safeguards.
- Continue a modest investment in reducing the risk of proliferation of weapons expertise, while undertaking a fundamental review of the highest-priority risks and the best means to address them.
- Continue to support disposition of excess plutonium in the United States and Russia, while reviewing cost-effective alternatives and seeking new agreements to expand the amount of plutonium subject to disposition and ensure that disposition will be permanent and secure.
- Offer new incentives for Russia to blend far more of its HEU to LEU, and accelerate the blend-down of United States excess HEU.

This is an ambitious agenda. Implementing it will require sustained leadership from the next president, who must move quickly to pursue these and other steps to reduce the threat. I believe that it is critical that the next president appoint a senior White House official with full-time responsibility for leading these efforts and keeping them on the front burner at the White House every day—as Congress directed last year.

Implementing this agenda will also require sustained Congressional support. Congress has a responsibility and an opportunity to exercise in-depth and informed oversight of these efforts, through hearings such as this one and legislation. Congress should give the administration the funding and authority to get the job done, while holding the administration responsible for demonstrable results. In this year in particular, Congress should focus on laying the foundation of policy and authority that will allow the next president to hit the ground running. With a sensible strategy, adequate resources, and sustained leadership, the risks of nuclear terrorism and nuclear proliferation can be substantially reduced. American security demands no less.

Senator DORGAN. Dr. Bunn, thank you very much. We appreciate the comments both of you have made.

Your testimony shows substantial agreement.

By the way, Dr. Bunn, you recommended increased funding in a number of areas. Did you aggregate your request? I noticed you made about three or four in various parts of your testimony.

Dr. BUNN. I have not aggregated them partly because in several areas I do not specify the amount required, and most of those are small ones. I think the total is of the order—it depends on whether you count a conditional appropriation for blending down HEU, but the total is of the order of \$600 million or \$700 million additional, I believe.

Senator DORGAN. That is a 50 percent increase in the budget.

Dr. BUNN. That is a large number.

Senator DORGAN. You have heard the testimony from Mr. Tobey that the amount requested in the President's budget is sufficient. You disagree with that?

Dr. BUNN. I believe that they are doing excellent work and that they will continue to do excellent work with the budget that they have requested, but I think there are additional opportunities to reduce risks faster and more broadly than they can be reduced with the budget that has been requested.

Senator DORGAN. My question was not whether they are doing excellent work. I made the same observation, of course.

But the question really is what kind of resources are we going to devote to this issue. What is the priority with respect to this issue of nonproliferation? The amount we invest in it tells us a little something about how important we believe it is.

Let me ask a couple of other questions. Dr. Hecker, in your testimony, you write that international efforts have been focused on limiting India's access to nuclear technology, but they have become self-sufficient. So we now do not have access to India's technology developments. You say this should advise our diplomatic efforts.

It seems to me that the message that India and other countries should take from all of this is just ignore the responsibilities, do not sign anything, do not be a part of the international community on nonproliferation, and some day you will get a reward for it because that is, in my judgment, what this agreement with India says. Tell me why that is an inappropriate conclusion.

Dr. HECKER. On the basis of my recent visit to India and in talking with the Indian nuclear establishment, if you are asking why do they stay outside of the nonproliferation arena—is that correct? I am not sure I understood your question correctly.

Senator DORGAN. My question is, why would India and other countries not take as a lesson from this that if they just say we are not interested in the Nonproliferation Treaty, we do not have any intention of being part of this international agreement, and by the way, if we just wait long enough, you will come to us, there will not only be no penalty for it, we will be rewarded for it because we will reach an agreement with the United States on a nuclear agreement? And that agreement will allow us to have certain nuclear facilities behind the curtain with which we can produce the material to build additional nuclear weapons. It seems to me that is the message of this agreement with India. Why would other countries and India not receive that very message? And that message in my judgment is destructive.

Dr. HECKER. That is a reasonable United States point of view.

Let me just, if I may, give you the Indian point of view, as I talked to the Indian nuclear complex people. And they view it very differently. They do not view themselves as a proliferator. They view themselves as a legitimate nuclear weapons state.

They happen to be caught on the wrong side of the divide when the decision was made in 1968, that those five countries that tested before 1968 would now be allowed to keep their nuclear weapons for some time, as article VI states, and others would not be allowed to acquire them. And the way the Indians view this is they did not test before 1968 in spite of the fact that they had substantial nuclear capabilities indigenously, much more so than China. But they, in essence, decided to refrain from nuclear testing. Their reward for refraining from nuclear testing is that they were now caught outside of the nuclear proliferation regime.

They view that as having been discriminatory from the word go. They will never then abide to it. They will never get rid of the nuclear weapons they have now until there is global disarmament. And so they view it and say, well, look, if you in the United States and the other four so-called parties of the permanent five get rid of your nuclear weapons, so will we. So it is not surprising that the Indians take a very different point of view.

To me now the issue is do you recognize the fact that India will not give up its weapons, and as I indicated in my testimony, I do not think our sanctions have particularly stopped its nuclear weapons program. What our sanctions have done, however, is slowed down their nuclear energy programs. In turn, they have made the Indians actually significantly more capable in nuclear energy technology to where today it may actually, I believe, be much in our benefit to have nuclear cooperation for nuclear energy with India. And so one has to do this tradeoff and in the end make the decision as to whether the risks are worth the benefits.

Senator DORGAN. But it is curious, it seems to me, when we talk about nonproliferation, that we are reaching an agreement with a country that will allow them to produce additional nuclear weapons outside of what has been the established normative here, that is, the Nonproliferation Treaty. But I understand your answer from the perspective of India.

I certainly believe the message we are sending to the world is hang in there. This country will recognize your right to build additional nuclear weapons. A lot of other countries would say, well, they are left outside of the effective date as well. That exclusive club that had nuclear weapons—what makes them so exclusive?

But let me go beyond this and ask. The renewed calls these days from some quarters for the reconsideration and ratification of the Comprehensive Test Ban Treaty—a treaty I support, by the way, a treaty unfortunately which the Senate rejected some years ago. Could you give your opinions on the issue? And as a former national laboratory director, Dr. Hecker, could you talk about the certifications and the scientific challenges with CTBT, and has progress been made in those areas? Because some have alleged that the capability does not exist to provide certification.

Dr. HECKER. I was there as director of record in 1996 when that decision was made by President Clinton, and I have reflected often on the overall decision of the Comprehensive Test Ban.

What I would like to say, particularly still being close to having had the responsibility at Los Alamos to certify the safety and the reliability of nuclear weapons, that test ban comes with a price. And there is no question today that, as I look back since 1996, the last 12 years, because of the test ban, it has taken us longer. It has cost us more to recertify nuclear weapons fabrication. That was particularly for the plutonium component that was moved from Rocky Flats to Los Alamos.

It is costing us from the standpoint of understanding the effects of aging in the nuclear stockpile, and slowly our confidence erodes, which could be boosted by nuclear testing. And so there is no question there is some risk associated with that. However, annually the laboratory directors must assess that risk and certify it to the President that the stockpile is still safe and reliable without nuclear testing. And I did so for several years and my colleagues have done so since then.

So now what I have to do is trade that off versus the benefits of a nuclear test ban, and there I say today that the greatest risk of going back to nuclear testing is that the Chinese would go back to testing and the Indians would go back to testing, the Pakistanis would go back to testing. And as I personally today weigh those risks, I definitely come out in favor that it is in our Nation's and the world's interest to actually ratify the Comprehensive Test Ban Treaty.

Senator DORGAN. Dr. Bunn?

Dr. BUNN. Well, I completely agree that it is in our Nation's interest to move forward with the comprehensive test ban. I think that as we look toward trying to strengthen the nonproliferation regime and get other countries to accept stronger safeguards, more export controls, tougher enforcement, and more restraints on fuel cycle facilities, that we will not be able to get that unless we are seen to be living up to our obligations under article VI of the Nonproliferation Treaty. And the most important single thing that the non-nuclear weapons states see as central to that is the Comprehensive Test Ban. And so that is a political factor, in addition to the technical factors that Dr. Hecker was mentioning.

On the technical side, I should also mention—I am sure Sig would agree—that the investments that we have made in the experimental facilities at the DOE facilities, the NNSA facilities, and the supercomputing and simulation capabilities have dramatically improved our understanding of the processes that take place in nuclear explosions compared to what they were before. There is a lot more that we know and there is a lot more that we know on the verification front as well. Seismology has moved forward very significantly since the Senate voted some years ago.

As you know, under General Shalikashvili, the National Academy of Sciences produced a report that looked at all of the technical issues that were raised in the Senate debate on the Comprehensive Test Ban and argued that all of them could be successfully addressed.

So I believe it is very important that the next President, first of all, recommit the United States to the Comprehensive Test Ban and then begin the process that will be necessary to build support over time in the Senate because the last thing we want to do is

bring it to the floor again in the Senate and have it voted down again. That would be, I think, a major mistake.

Senator DORGAN. It is sort of counter-intuitive when we talk about nuclear weapons and risks. I was just thinking, Dr. Hecker, you described the risk of them not working, but we have always built nuclear weapons with the understanding we are building them so that they can never be used. And the risk is not so much that they would not work. The risk is that they would be used and would work. So it is sort of counter-intuitive even to discuss a weapon that, in my judgment, can never again be used on this planet because we have got tens of thousands of nuclear weapons.

I am going to submit questions on RRW and some other issues because I have taken more time than I wished.

Dr. HECKER. Mr. Chairman, if I may just say, I respectfully disagree with that, and that is, that yes, indeed, we expect and hope those weapons will never be used. However, if we have them in the stockpile, first of all, we must assure that they are safe—that is a huge, huge job—and that if our Nation's defense rests on that, that they do work, to both assure our own leaders and also to assure our allies. So I think it is no good to have a deterrent in the stockpile that is deteriorating that we lose confidence in. We must have confidence in spite of the fact that we hope to never use it.

Senator DORGAN. Yes. Our Nation's defense, in my judgment, rests on the notion that they can never be used because there is no defense that provides any assurance for any life in this country if we have exchanges of nuclear weapons on this planet.

The point you make is a scientific point and an understandable point to me, that as long as weapons exist, you want some assurance that they will detonate if used. I think any potential adversary on this planet would be just nuts to believe that our nuclear stockpile somehow is something that does not work.

Having said all that, we have nuclear weapons. First, we have to protect them to make sure they are not in the wrong hands, and when I speak this way about nuclear weapons, people call.

But at any rate, I think both of you have an unbelievable amount of information to provide the Congress and have done so over the years, and I deeply appreciate the work and your testimony today.

I am going to submit questions, as I said on RRW, on and a couple of other things, if you would be kind enough to respond to them.

Senator DORGAN. Let me call on my colleague, Senator Domenici.

Senator DOMENICI. Thank you very much.

Let me just say I am not a scientist like Dr. Hecker. I do not think his answer disagrees with you, it was a scientific answer. But without a lot of words, I want to say that I would put my marbles on your side of the argument, Dr. Hecker. I appreciate your being here to give us your expertise.

Let me talk with you a minute about North Korea, Dr. Hecker. I was privileged a number of years ago, maybe seven. Five Senators and their wives were permitted to land the first American airplane in North Korea at their capital city. We stayed there 2 days. They have an encampment for visitors that is much like Russia had when they had a communist state. It was off on the side and it is beautifully built, and you would never know that poverty

abides everywhere because it is a very nice, beautiful looking place. But the visit truly pointed out what an abominable place it was to live.

I assume in your trips you have been permitted to see more of North Korea than just the place where we put guests. You have visited some cities. You have seen something of their infrastructure and how they live. Is that a fair statement?

Dr. HECKER. Yes. I have been able to see more of North Korea than, let us say, just the inside of the ministry of foreign affairs and Yongbyon. However, everything that they show us, of course, is heavily scripted. But, nevertheless, on the drive out to Yongbyon you see a lot of the countryside, and I had occasion in August 2007 to be going out there when they had the heavy floods that caused the enormous damages. I got a chance personally to view what their infrastructure is like, and quite frankly, for the most part, they have a difficult time getting things together. But when you get into the nuclear complex, they have clearly put their capabilities there.

But the place is changing. Over the five trips that I have taken, I have seen Pyongyang change. I would say, in spite of everything we think, the place is not about to fall apart.

Senator DOMENICI. So you think the government is truly in control.

Dr. HECKER. Yes. You mean the nuclear weapons and the nuclear materials?

Senator DOMENICI. The nuclear weapons and the nuclear materials are in very good shape and controlled adequately by the government. Is that correct?

Dr. HECKER. Right. And I have had that discussion directly with the people at Yongbyon to express our concern, your general concern, about nuclear material security, and what they say, of course, is not to worry. We know how to protect our materials. My assessment in North Korea is that, yes, the government controls those materials. What you have to worry about is making sure that the government itself does not export those materials.

Senator DOMENICI. I think what I am going to do, Dr. Bunn—I have a number of questions. I think I am just going to submit them, but I would just end this conversation with you with a little discussion of Iran. In fact, both of you are free to discuss with me what you like on Iran.

We happen to be talking about two of the most difficult situations when we speak of North Korea and Iran. Could I ask both of you to talk about your concerns with reference to where Iran is today and where you think they are going to go? And are we handling the situation correctly in terms of trying to inhibit them from getting a nuclear weapon at this point? Let us start with you, Dr. Hecker.

Dr. HECKER. My view is that Iran is putting in place all the pieces for what I call the nuclear weapons option, and it is not only the highly publicized facilities at Natanz for uranium enrichment which is one path to the bomb, that is, to enrich uranium to bomb-grade. They are clearly doing that under the umbrella of saying they are doing this for nuclear energy, and it turns out that is legitimate. But, of course, the concern is if they keep going, they can

make bomb-grade material. That is what worries us, and we have no assurance at this point that they will not keep going.

But they also have a program that is much less publicized and that is, they are building a small reactor. And it is the type of reactor that would make good bomb-grade plutonium the same way that North Korea is making bomb-grade plutonium. It is a little different design, but it makes just as good bomb-grade plutonium. And they are continuing with that project although at a reasonably slow pace, but they are continuing. And associated with that, they have developed a heavy water plant that supplies that reactor which is necessary for eventually making bomb-grade plutonium.

The fact that they have all those pieces in place worries me significantly. And yet, as to whether they have made the decision to go to nuclear weapons, I cannot tell that, but the capabilities are such that they could do so in the future.

In terms of what we are doing currently, I guess much like in North Korea, I feel in the end that you are best off if you have an in-country presence, if you have a dialogue regardless as to how distasteful you might find that dialogue. I think we missed a significant opportunity in 2003 with Iran, as we missed a significant opportunity in late 2002 with North Korea. Now it is more difficult to get back in the game.

I still favor the dialogue, but somehow we still also need to look at plan B, what if all of this fails. The most important way that I could see at this point to get Iran to take a somewhat different tack is you have to enlist China and Russia to put a serious squeeze on Iran to make sure that they understand that developing that complete nuclear weapon option cannot be done for free.

Senator DOMENICI. Dr. Bunn?

Dr. BUNN. I think, unfortunately, that our—I agree completely with Sig that we missed a major opportunity in 2003 and also some other opportunities with Iran. I think that our policy of refusing to talk, while the Iranians kept building, essentially just gave the Iranians the opportunity to keep building. And so now we are where we are today with more than 3,000 centrifuges in place in Natanz, and unfortunately, we have to cope with that reality.

I think that the next President is going to have to engage if we are going to get any kind of restraint on the Iranian program, and we are going to have to put together a package of carrots and sticks that is big enough and credible enough. And I think it has to have some significant carrots and not just the sticks to convince the Iranian Government that it is in their interest to reach an agreement that deals with at least some of our security concerns, and if we are going to convince them of that, it has to be something that the advocates of compromise in Tehran can go to the Supreme Leader Khamenei and make the case and win the debate with the hawks in Tehran. And that means we are going to have to address some of the Iranian concerns if we want them to address some of our concerns, and it is going to be a difficult discussion. It is going to involve some hard choices.

I had the opportunity—a couple of years ago, we had in our research group at Harvard a former deputy foreign minister of Iran, and shortly after his arrival, he had said to us that, while he would come, he would not actually write about nuclear matters while he

was in the United States because it was too sensitive back home. A week after he arrived, he sat down in my office and said let us write a joint proposal for how to solve the Iranian nuclear problem. I said, surely, you must be kidding. There is no way that you and I could possibly come to an agreement on what ought to be done with Iran's nuclear program. And in the course of a day, we actually did and then published a piece that was a joint proposal on how to address the Iranian nuclear problem.

So the experience that there are people who remain well placed within the Iranian regime who are willing to compromise made me at least a little more optimistic, but it is going to be a hard problem.

Senator DOMENICI. Thank you very much.

Senator DORGAN. Senator Feinstein?

Senator FEINSTEIN. Thank you very much.

You both are very respected, and it is a very fine thing for us to be able to listen to your views.

Dr. Bunn, I have been reading your statement, and I want to ask you about one part of it in a moment. But could you please send the committee your recommendations as they relate to the numbers, the dollars, for each of the areas in writing? We would appreciate that very much.

But I wanted to express my concern, Mr. Chairman, because I very much agree with your views on this issue, the fact that we have cut out the money for new nuclear programs.

And I do want to raise an issue of the labs. I am very concerned because I am really not sure where this is going. All of the labs are taking cutbacks. I know in some detail about Lawrence Livermore. I do not know about the other two.

However, at Lawrence Livermore, there is a \$280 million shortfall. They are terminating 750 people, 250 voluntarily, 500 not voluntarily. Pink slips will go out in May. Three hundred and fifty of them are senior scientists and engineers. That should be a real national security danger point. I have had two discussions with Mr. D'Agostino, whom I respect greatly, who has pointed out to me that the labs now need to become more competitive and they are going into nonproliferation areas. I do not know what this means with specificity. I am very concerned about it.

I am also very concerned about when you add up the cutbacks at Los Alamos, Sandia, and Lawrence you are going to have many, many senior scientists and engineers without employment. I think this is a national security danger point.

I also think that we ought to know exactly where these labs are going. As they have associated themselves with a private contractor, they lose their exempt status. They become LLC's. They have to pay taxes, and there is a fee associated with them which, in the case of Lawrence Livermore, is \$44 million this year for Bechtel. So where are these labs going to go long-term now? And what are they going to sell? To whom are they going to sell? I think we ought to begin to take a good look at that.

Senator DOMENICI. I am with her.

Senator FEINSTEIN. Now, let me go, Dr. Bunn, to your statement, particularly on the limited role of radiation detection. You point out that neither the detectors being put in place nor the advanced

spectroscopic portals planned for the future would have much chance of detecting and identifying uranium metal with modest shielding, although they might be effective in detecting plutonium or strong gamma-emitters used in a so-called dirty bomb.

This is a big area of concern for many of us. You say that it is worth making some investment in radiation detection but not putting undue reliance on this line of defense. The NNSA's second line of defense has been successful in cooperating with many countries to put radiation detection in place at key ports and border crossings. You go on then to describe a modified approach to cargo scanning.

Could you please verbally share this with this subcommittee? This is one of our big concerns. I can speak as somebody on the Intelligence Committee, a big concern about a dirty bomb coming into this country in some way. What do you believe is the most effective way we have of detection?

Dr. BUNN. Well, I think, first of all, that we really need to look at it from a systems point of view and not just does this detector at this particular border crossing work. You have to think about, okay, if I am the bad guy, am I going to see that that detector is in place and go around that border crossing and go somewhere else. So you need to look at it from the point of view of the effectiveness of the total system, not just the effectiveness of a particular detector at a particular point.

Now, I think the detectors we are putting in place now will work very well in detecting the kinds of things that would typically be used in a dirty bomb except in the case of alpha-emitters, like americium 241 that would be hard for them to detect because alphas are not very penetrating. But I think overall the dirty bomb threats are bigger from the big gamma-emitters like cesium and cobalt and things of that kind.

Now, I do believe that in my view Congress made a mistake in insisting on scanning of 100 percent of the containers coming to the United States. I think that is going to be very expensive. I think it is probably not going to be doable because in some cases, for example, a container gets shipped out of one port, heading for another point, and then it gets shifted from one boat to another without ever getting to the other port, and then comes to the United States when you did not know it was headed for the United States when it left the first port. That is just some of the realities of global shipping today.

So I believe what we need to focus on is what would we need to do to deter the terrorists from using those containers, and that means we need to make sure that the terrorists think there is a big risk that that container will be scanned, think that there is some significant risk that what they have put in it will be found if it is scanned, and think that we will take some significant action if it is scanned.

The way the law is written now, there are no standards for how good those scans should be, what actions should be taken if something is found, and I think it creates an incentive to put in a lot of shoddy scanning, frankly. You know, a country claims, oh, yes, I scanned that, but there is no good scanning.

Again, you have to look at the total system. What if you scan a container and then you put a seal on it, but it is a crappy seal and anybody could open the thing after you have scanned it and put something in there and put the seal back on, and nobody would be the wiser? So you have to look at the whole system to understand how effective it is going to be and where the vulnerabilities are because, frankly, the bad guys we are dealing with are intelligent folks, and they are going to be watching what we are doing and trying to figure out what the weaknesses are, just as they noticed that we were not looking for box cutters on airplanes before 9/11.

Senator FEINSTEIN. Thank you very much. I think my time is up. So let me stop now. Thank you.

Senator DORGAN. Senator Allard?

Senator ALLARD. Thank you. I just have one area that I wanted to inquire about and that is the additional dollars to put into the International Atomic Energy Commission. I think the request for \$5 million to \$10 million. What is the basis for this specific request, and how did you arrive at that particular amount?

Dr. BUNN. Well, this is specifically for the IAEA Office of Nuclear Security. This is something that existed in sort of embryonic form before 9/11, but it really grew substantially after 9/11.

They spend about \$20 million a year today. They provide, I think, critical services in providing international peer reviews of nuclear security arrangements, not only physical protection but also control of radiological sources, border radiation detection, and the like, development of international recommendations of standards for different aspects of nuclear security, and also tracking of nuclear smuggling for the entire world community, not just for the U.S. Government. A lot of these things are things that we cannot do as well ourselves because the IAEA has the sort of international legitimacy of being an unbiased international institution.

Another \$5 million or so would allow them to significantly increase the pace at which they can meet member state demands for peer reviews of nuclear security and other nuclear security assistance. I think it would make a significant difference in the effectiveness of that operation. This goes into what is now called the nuclear security fund, which is almost entirely voluntary contributions by states. I think ultimately we need to move security into the regular budget of the IAEA so that states do not have to keep coughing up these voluntary contributions.

Senator ALLARD. How would you evaluate their job? Do you think that they have strengthened nuclear security worldwide?

Dr. BUNN. I think they have contributed significantly. I think there are weaknesses. Some of the weaknesses are their fault. Some of the weaknesses are imposed on them. For example, they are constantly struggling with not having enough money and almost all the money they do get is earmarked by the various donor states that provide the money. And so they frequently come up—you know, they send a team out somewhere and they come up with some urgent priority that needs doing and they have not got any money to do it.

Now, as I mentioned, I think they do have a tendency to be a tad on the bureaucratic side and to focus perhaps more on the legal niceties than on getting the job done in some cases. But I think

overall they are doing as well as we can generally expect these international institutions to do, and I think that money would be well spent and well invested.

Senator ALLARD. And you are confident that—the \$5 million to \$10 million that we would put in there—does it go with strings attached, or is it flexible money?

Dr. BUNN. It depends on what Congress tells the NNSA to do. I am sure that if Congress simply said it needs to go to the IAEA and let NNSA decide how, that NNSA would attach strings. There is no doubt in my mind about that. So I think that is up to Congress to say either give it as money that they can spend on their own priorities or allow NNSA to make sure that they spend it on NNSA priorities.

I personally would prefer that at least a significant portion be available to the office without strings so that when they do encounter these unexpected opportunities to reduce risk, that they will have some money available to do that.

Senator ALLARD. Thank you, Mr. Chairman.

Senator DORGAN. Thank you very much, Senator Allard.

Senator Domenici, did you have any additional inquiry?

Senator DOMENICI. Thank you, Mr. Chairman. If you do not mind, just a couple, I will not take long.

Maybe I could ask Sig this question regarding North Korea. What do you make of the current reports of North Korea's nuclear cooperation with Syria? And then Israel bombed the major facilities. I have been briefed and seen what I am permitted to see that I cannot bring here, but I know Israel did wipe out a major facility that was shown before its being bombed and the evidence indicating that it was a nuclear bomb facility.

What do we do about and what is your thinking about North Korea doing these kinds of things while we are working with them? Would it be credible that they would negotiate something honestly while they are doing this kind of thing with Syria?

Dr. HECKER. My opinion is that the CIA in its revelations a week ago made a very credible case that the facility in Syria was a nuclear reactor. They made a credible case that most likely North Korea built that reactor with Syria. So I personally believe there was a very strong connection between North Korea and Syria. It is a collaboration that had been ongoing at least for the last half a dozen years or so and perhaps planned for the last dozen years or so. And it went on at least until the time that Israel bombed it.

In terms of the immediate risk, of course, it turns out Israel took care of the immediate risk because Syria itself does not appear to have the capabilities to have done much with that, and that is why it, in essence, needed the turnkey operation.

This to me, in terms of our relationship with North Korea, is the most troubling. And my own sense with North Korea has been sort of a two-pronged approach, all of it based on making certain that the actions we take with North Korea actually reduce the risks to us. And that is, first, make sure that they make no more plutonium, and that is where disabling and dismantling the Yongbyon facilities come in. And that has to remain first priority. No

Yongbyon, no more plutonium, no more bombs, and no better bombs. That is key.

The second is no export. The key thing is the export of the plutonium. There cannot be export of plutonium. I personally believe that there was not because North Korea had so little. Again, if they make no more, the chance of exporting plutonium goes down.

However, then the next risk is exporting the nuclear technologies such as building the reactor. And quite frankly, to me what is of much greater concern is that export occurred to Iran rather than Syria. Syria in the end cannot do much with it, but Iran could do much with it.

And so that has to be the next point to press with North Korea in our negotiations. I do not believe that all of that is going to be forthcoming right now in the declaration. I think it is more important to go ahead and eliminate Yongbyon and then make certain that we walk down the path because what Syria has demonstrated is that in spite of the fact that we have been watching so closely—we think our technical national means are so good—they built a whole reactor under both ours and the Israelis' watchful eyes. How did they do it? What does that mean in terms of international proliferation rings? These are very serious issues to all of the questions that you have put on the table. North Korea could actually now help us unravel that, and that is the place where we have to press them. But let us shut down Yongbyon first. That is my view.

Dr. BUNN. Let me just add that in one respect the Bush administration has done a better job than Will Tobey admitted in that the October 3, agreed statement does, in fact, commit the North Koreans not to export any nuclear technology or materials. Now, our ability to verify that, of course, is another question, but there is the commitment in place signed by the North Koreans. And the North Koreans have repeatedly reiterated that commitment, including in Sig's most recent trip. So I think that is very critical. The North Koreans have heard the message that that is a red line for us and they have committed not to cross that red line.

Senator DOMENICI. What is going on that makes North Korea, in your opinion, willing to make any agreements with our world versus theirs? Why do you think they would do this?

Dr. HECKER. I am sorry, Senator.

Senator DOMENICI. Why will they enter into agreements and carry them out with the United States and others? Are we giving them something that they need? Are we going to help them feed their people? Why would they do this?

Dr. HECKER. I am best at evaluating their capabilities, not necessarily their intent. But having been there a number of times, I actually believe that they recognize that their economy is in serious trouble. They have to do something to feed their people. They actually do view, in my opinion, the United States as the key to that. The United States holds the key to international commerce, and even though the Chinese and the South Koreans are helping to feed the North Koreans now, in the end, the North Koreans recognize unless they strike some sort of a deal with the United States, they are not going to be able to get out of the economic hole that they are in. I personally believe that is why they are trying to make the deal with the United States.

Senator DOMENICI. Well, let us hope we remain economically strong enough for their belief in us to be a reality. I am not sure of that.

Senator Feinstein, since you talked about something a moment ago, might I say that on the Los Alamos layoffs, there is a very different flow of those people leaving and what were the people leaving doing—it is much different than Lawrence Livermore. Nonetheless, it is a serious problem, and I would say your willingness to try to do something about it—I will join you. I have talked to the chairman enough about it. I think he would.

The problem is we do not have anyone that understands this problem that is in the business of allocating the money that goes to the various subcommittees. If somebody allocating knew that we cannot take care of the laboratories and the water programs, the Corps of Engineers programs on the money that is being given to us—we have to trade off water programs for the laboratories. God only knows, nobody would ever have thought we would be doing that, but that is the budget we have got. The big, giant Corps of Engineers—and everybody wants that, and that is to be matched up with the most vital science part of the national budget that there is, the national laboratories. It is kind of a crazy thing.

I managed to get by for about 12 years doing it, but it is coming to a head as the squeeze is put on the discretionary domestic programs. We get knocked in the head on that on our side. So do you. So I do not know how to solve it, but I am willing to try with the chairman who knows our allocation must go up or we will have the same problem again.

Senator DORGAN. Well, if I might say, our allocation is a serious problem. As you know, last year we went through—this is very destructive, this process that we are in, where we do not even get appropriations out until December or perhaps January because then you are 4 months into a fiscal year running a laboratory without any notion of what kind of resources are going to come your way.

But the fact is—there is lots of responsibility on all sides for this. We get an executive budget that cuts to the bone domestic discretionary, and our subcommittee cuts \$1 billion out of water projects in the Corps and the Bureau in this year. We are not going to do that, but that is what the executive budget does.

Then the President says I want \$196 billion in this fiscal year as an emergency for Iraq and Afghanistan, and then we add in the appropriations process for this fiscal year \$21 billion on domestic discretionary. The President says I am going to veto all those bills. So we are at a standoff.

Now, Senator Domenici is correct that within the confines of the resources we have available, trying to negotiate with a President that last year said I do not intend to negotiate, it is going to be my way on domestic discretionary—within the construct of that, as Senator Domenici is talking about, what kind of allocation do we get in this subcommittee versus other subcommittees? But frankly, the whole system is broken at this point.

And I just want to make a point that I think that if we continue down this road, we are going to dramatically weaken and injure all of our national laboratories, and I have said before these are national treasures. These are repositories of investment—they are in-

vestments in the future, repositories of vast amount of knowledge and talent. And if we lose that, we will lose a lot more than just a few layoffs or even thousands of layoffs, as the Senator from California indicated. We need to find a way, even outside of the discussion about should there or should there not be an RRW, even outside of those issues, to stabilize the employment levels at our national laboratories so that they can continue to attract our best and brightest and continue to do the work that gives us the innovation for the future. We are going to try to do that.

But boy, I am telling you, I think the entire system is broken. It starts at the White House and continues on through here. I think the President and the Congress have to understand what we are going to lose if we continue down this road.

Senator FEINSTEIN. If I may, Mr. Chairman. I agree with what both of you said, what Senator Domenici said. After listening to Mr. Anastasio talking to the head of the nuclear agency, what they are doing is accommodating the people to the budget, which is dropping dramatically. That also changes the mission.

What we do not know is how the mission of the labs is going to be changed by this, and I think we ought to know it. Now that there is competition and privatization in these labs, how exactly is that mission going to change? I do not want to get 5 years down the pike and find out that something dreadful is really happening at the labs that we did not know about, and this worries me greatly. So I would hope that we can get the actual figures. We can talk with people who know.

Mr. D'Agostino tells me, well, they are going more into non-proliferation. What exactly does that mean? What do they do? Are they selling? What are they selling? So I think we need to know the answers to these questions, and I look forward to working with you.

Senator DORGAN. Let me just say that I consider this a priority, and I think our staffs will work with us to try to determine, within the confines of the rather broken system we are working in at the moment—we need to find a way to strengthen and try to provide some stability for our national laboratories. So that will be a priority for this subcommittee.

As you know, we probably will mark up sometime in late May or early June in a subcommittee, and then go to a full committee markup. And I guess the question this year is going to be will there be negotiations with the White House—if so, when—on domestic discretionary. But we have taken a pretty good whack on the domestic discretionary recommendations in the President's budget. Last year he did the same and said I am not going to negotiate from that point really. Again, there is lots of responsibility on all sides for this. We have to try to get this right.

Dr. Hecker, you wanted to comment?

Dr. HECKER. Yes, Mr. Chairman, Senator Domenici, Senator Feinstein. Senator Feinstein, you raise a question that is very near and dear to my heart. For 34 years, I worried precisely about that and especially the 12 years as director at Los Alamos.

Just to briefly comment. To me it takes three things that we need to sort out. One you have mentioned is the mission. Quite frankly, as Senator Domenici knows, in 1992 when the Soviet

Union collapsed, we had to struggle with that, but we found a mission. We decided what the laboratories needed to do from a national interest. I think the mission can also be redefined, but obviously, somebody has to do it. The mission is still there. So, first, mission.

Second, budget and you have mentioned that. Clearly, the budget is important. I will not need to elaborate on that.

But third no one has mentioned, and it is actually in my opinion the most important, and that is the environment at these laboratories. When we went the direction of contractorization, we made a grievous error of pushing these laboratories in a direction that simply is not right for this country, and we have suffered from that. The whole environment at these laboratories has changed.

Second, over the last, I would say, now 16 years, the regulatory environment at these laboratories has become so risk-averse that we essentially cannot get work done anymore. In 1965, I came to Los Alamos as a young student because it was the best place to go work. Unfortunately, these laboratories today are not the best places to go work anymore, and we need to make them such. And just more money does not do the trick. We have to change the working environment to allow people to get their work done. These places nowadays look more like prisons than they look like university campuses or something in between, which is what we tried to make them. Attract the best, protect the most important. We have lost the sense of all of that. That is one of the reasons why these laboratories are suffering today.

So, Mr. Chairman, when you say the system is broken, it is broken in many different ways, and we should fix. I agree.

Senator DOMENICI. What did you say? When we moved toward what? Privatization you said?

Dr. HECKER. I am sorry.

Dr. BUNN. He said contractorization.

Dr. HECKER. Oh, I am sorry. The contractorization to actually move the system, as Senator Feinstein has pointed out, to limited liability corporations, companies that are for-profit companies where we are paying enormous amounts to have these laboratories run. These laboratories used to be run as a public service for the United States of America. They should not be run for profit. What we do in essence is a semi-government function.

Senator FEINSTEIN. The University of California did this as a public service to the country.

Dr. HECKER. Correct.

Senator FEINSTEIN. And now essentially they are replaced by private companies that charge substantial fees.

Senator DORGAN. At a recent hearing, we developed that point, that there is a substantial increase in costs as well. And I think there is a difference in culture I think is what you are referring to.

CONCLUSION OF HEARING

Let me thank both of you for being here and contributing to the subcommittee.

This hearing is recessed.

[Whereupon, at 11:39 a.m., Wednesday, April 30, the subcommittee was recessed, to reconvene subject to the call of the Chair.]